ICDM2

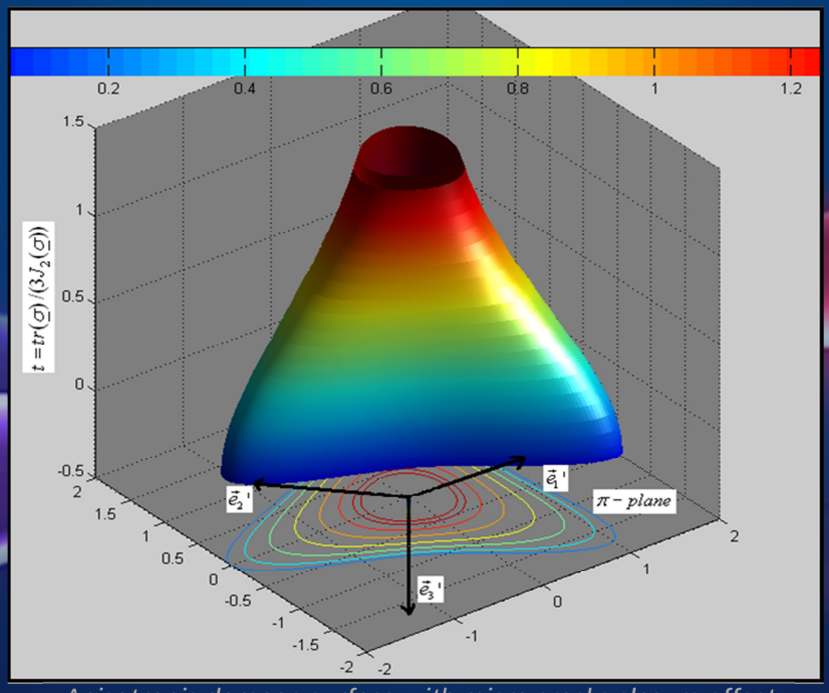
SECOND INTERNATIONAL CONFERENCE ON DAMAGE MECHANICS

utt
université de technologie Troyes

PROGRAM BOOKLET

The Second International Conference on Damage Mechanics

(ICDM2)



Anisotropic damage surface with micro cracks closure effect

July 8-11, 2015 University of Technology of Troyes (UTT), Troyes, France

TABLE OF CONTENTS

University of Technology of Troyes

The Heart of Troyes

Troyes Centre Ville

Tools and Trade Museum

In Memoriam

Professor C.L.CHOW
1934 - 2015

Dr. Chi Loong Chow was born on November 14, 1934, in Shanghai, China, to father Chow Kem Dan and mother Cheng Hum Fong. They moved to Hong Kong when C.L. was 12 years old. He received his B.S. degree in Mechanical Engineering in 1959 from Waseda University in Japan, his Ph.D. degree in Mechanical Engineering in 1965 from the University of London, and his D.Sc. degree in Mechanics of Solids in 1986 from the University of London.

Dr. Chow was Professor and Chair of the Department of Mechanical Engineering, the University of Michigan - Dearborn. Prior to his appointment at the University, he was Director of Mechanical Engineering Program at Southern Illinois University at Edwardsville from 1990 to 1992, and Chair Professor and Head of Department of Mechanical Engineering, University of Hong Kong from 1982 to 1990.

In addition to his academic career, he also worked in various industries for about ten years including English Electric Co., General Electric and BF Goodrich Co. Dr. Chow's principle research interest was in the area of Mechanics of Solids and Structural Analysis with special emphasis in Fracture and Damage Mechanics. The materials chosen for investigation included both metallic and polymeric materials subjected to static and dynamic loading. He published over 160 technical papers mostly in referred journals. He was the Founding Editor and Editor-in-Chief of the International Journal of Damage Mechanics since 1991. Further, Dr. Chow was the founder of the International Conference on Damage Mechanics (ICDM), www.icdm.rs, together with Prof. J. Woody Ju and Prof. D. Šumarac in Belgrade, Serbia, in June-July 2012, and one of the Directors of ICDM2 Conference, www.icdm2.utt.fr (with Prof. J.W. Ju, J.-L. Chaboche, Y. Toi, D. Šumarac and K. Saanouni) in Troyes, France, in July 2015.

Dr. Chow had made distinguished contributions and internally renowned achievements in the field of damage mechanics, fracture mechanics and mechanics of solids. Dr. Chow passed away on May 28, 2015. He will live forever in our hearts and minds.

The ICDM2 Directors
June 2015

General Information

Welcome to ICDM2! This document includes all the information you will need as an attendee of ICDM2. We are glad to see you at ICDM2 and hope that you will have a great time!

CONFERENCE DATE
Scientific days: July 8th – 10th 2015 (Wednesday – Friday)
Saturday 11th: Free program

REGISTRATION (& WELCOME COFFEE)
Date / Hour: Wednesday July 8th 2015 / 08:00 – 09:30
Place: University of Technology of Troyes (UTT). Reception Area

CHAMPAGNE TASTING AND WELCOME BUFFET
Date/Hour: Wednesday July 8th / 20:00 – 22:00
Place: La Maison de l'Outil et de la Pensée Ouvrière (Tools and Trade Museum)

CONFERENCE VENUE
The conference will be held at University of Technology of Troyes (UTT), Troyes, France.

CONFERENCE LANGUAGE
The official language of the conference is English.

CONFERENCE PROGRAM BOOKLET
The Conference Program Booklet will be given to all registered participants.

BADGE
Wearing a badge is mandatory in order to have access to the scientific sessions, refreshments and social events.

WIFI
Network name: **ICDM2**
Password: **icdm2UTT2015**

COFFEE BREAK
Coffee breaks are available between sessions and the coffee break stand is located in the hall of building N (see the conference layout)

LUNCH
Lunches are provided every day to all participants (included in the registration package) at the university restaurant nearby. Participants are kindly asked to give their lunch ticket when entering the restaurant.

GALA DINNER (BANQUET)
Date / Hour: Thursday, July 9th 2015/ 20:00 – 23:00
Place: Centre de Congrès de l'Aube (see page 51)

LOCAL TIME
GMT +1

ELECTRICITY SUPPLY
The electric voltage is 220 Volts at 50 Hz.

SMOKING POLICY
Smoking is prohibited inside the premises. Specific places are available for smokers outside the buildings.

CERTIFICATE OF ATTENDANCE
A Certificate of Attendance will be given to all registered participants.

PROGRAM CHANGES
The Local Organizing Committee cannot assume liability for any changes in the program due to external or unforeseen circumstances.

FREE PROGRAM ON SATURDAY
Participants are free to visit the downtown Troyes or visit the factory outlets during the sales period. For those who wish to shop at the factory outlets, we provide coupons and a shopping bag on a first come-first serve basis. Please ask at the conference welcome desk before Saturday.

LABORATORY VISITS
Interested people should register at the welcome desk.

CONFERENCE WEB PAGE
http://icdm2.utt.fr/

ICDM2 ORGANIZING COMMITTEE
+33 3 25 71 76 94

IMPORTANT PHONE NUMBERS

Taxi Troyens	+33 3 25 78 30 30
Taxi de Sainte Savine	+33 6 73 85 29 76
Taxi de Bréviandes	+33 6 84 82 82 64
Train SNCF	36 35
Airport Paris Charles de Gaulle	+33 1 70 36 39 50
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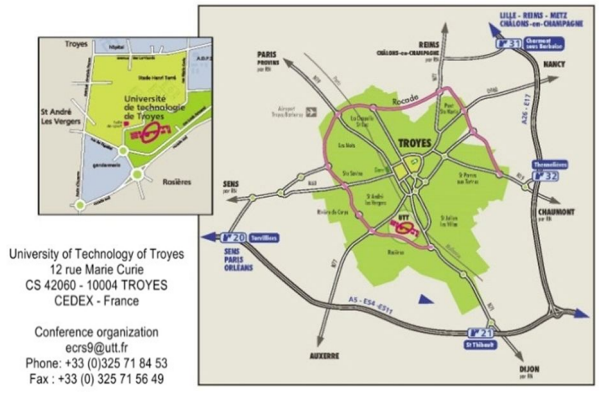

University of Technology of Troyes
12 rue Marie Curie
CS 42060 - 10004 TROYES
CEDEX - France

Conference organization
ecrs9@utt.fr
Phone: +33 (0)325 71 84 53
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Preface

During the last decades, the theory of damage mechanics has made significant progress and established itself capable of solving a wide range of engineering problems. To date, the damage mechanics is clearly identified as a scientific field focused on studying the effect of various nano, micro and macro defects on the behavior of materials, bridging the gap between the well-established fields of continuum inelastic deformations and the classical fracture mechanics with growing macroscopic cracks. The main objective of the conferences series entitled the nth International Conference on Damage Mechanics (ICDMn) is to bring together leading educators, researchers, scientists, engineers and other practitioners discussing and exchanging ideas on recent advances in the field of damage mechanics. On the foundation of the International Journal of Damage Mechanics (IJDM), this conferences series, held every three years, aims to become the premier international forum on damage mechanics research dissemination.

This Second edition of the International Conference on Damage Mechanics (ICDM2) held at University of Technology of Troyes (UTT) in France from July 8th to 11th 2015, takes place after the first edition ICDM1 in Belgrade from June 25th to 27th 2012. It provides a forum for scientists and practicing engineers alike to present the latest findings in their research endeavor and at the same time to explore future research directions in the field of damage and failure mechanics. Both the irreversible damages and the reversible damages due to self-healing are concerned.

About 160 communications have been submitted to ICDM2 from 28 worldwide countries, with 66 full papers and 93 abstracts. Finally, 123 oral presentations are programmed during the three scientific days of the conference including 66 full papers and 57 abstracts including the 5 plenary lectures and 7 talks presented in the framework of two mini-symposia dedicated to Prof J.L. Chaboche (ONERA, France) and G.Z. Voyiadjis (LSU, USA).

The 111 oral presentations have been programmed in parallel sessions and are grouped in three main themes:

- Theme 1: Theoretical Modeling in Damage Mechanics
- Theme 2: Numerical Simulations in Damage Mechanics
- Theme 3: Experimentation and engineering application

The 66 selected full papers will be published online in the Periodical Applied Mechanics and Materials, Vol. 784 in 2015 with the title "**Damage Mechanics: Theory, Computation and Practice".** Each author may access (free of charge) his paper(s) online and download a PDF version from http://www.scientific.net .

Finally, we address our warm thanks to all the authors and participants to this second ICDM edition. Also, our thanks are due to public and private sponsors who, through their financial support, helped significantly the organization of this event: Région Champagne-Ardenne, Conseil Général de l'Aube, Grand Troyes, l'Association Française de Mécanique (AFM) and MECAMAT. Also, many thanks are due to Université de Technologie de Troyes (UTT) and to all our colleagues from the LASMIS/UTT team for supporting the practical organization.

For the local organizing committee
K. Saanouni (UTT), Chairman
A. Dragon (ENSMA, Poitiers), Co-Chairman
C. Labergère (UTT), Co-Chairman

Directors of ICDM Conferences Series

Prof. C. L. Chow - University of Michigan, Dearborn, USA
PhD from the University of London at Imperial College of Science and Technology (1965) and D. Sc degree from the University of London (1986) in Mechanics of Solids. Editor-in-Chief of the Int. J of Damage Mechanics. Associte Editor of the International Journal of Mechanical Science. Fellow of I. Mech. E, Fellow of I. Marine E., Fellow of the Inst. of H.K. Engineers.

Prof. J. W. Ju - University of California at Los Angeles, USA
PhD from the University of California at Berkeley in Structural Mechanics (1986). Currently distinguished Professor at UCLA and at Tongji University. Editor of the Int. J. of Damage Mechanics, Editor of the J. of Composites, Associate Editor of the J. of Nanomechanics and Micromechanics, and Editorial Board Member of the Acta Mechanica. Fellow ASME, Fellow ASCE, Fellow ACI, Fellow USACM, Fellow IACM.

Prof. J.L. Chaboche - ONERA, Chatillon-sous-Bagneux, France
PhD from the University of Paris VI (France), in Physics (1978), Currently Research Director in the Department of Metallic Materials and Structures of ONERA, The French Aerospace Lab., Editor of the Int. J. of Damage Mechanics and member of the Editorial Board of the Int. J. of Plasticity and of Archives of Mechanics (Polish Acad. of Sciences), co-author of 4 books in Solid Mechanics.

Prof. Y. Toi - University of Tokyo, Japan
PhD from the University of Tokyo (Japan) in Naval Architecture (1979), Currently full Professor of computational solid mechanics at the University of Tokyo (at the Department of Mechanical and Biofunctional Systems, Institute of Industrial Science), Visiting Associate Professor at Georgia Institute of Technology (1987-1988), Editor of the Int. J. of Damage Mechanics.

Prof. D. M. Šumarac - University of Belgrade, Serbia
PhD from the University of Illinois at Chicago (USA) in Damage Mechanics (1987). Currently full Professor at the University of Belgrade. Minister of Construction at the Serbian Government 2001-2004. President of Serbian Chamber of Engineers since 2007. Member of European Academy of Sciences since 2010. Editorial Board Member of the Int. J. of Damage Mechanics.

Prof. K. Saanouni - University of Technology of Troyes, France
PhD from University of Technology of Compiègne (France) in Solid and Structural Mechanics (1988). Currently distinguished Professor of solid and structural mechanics at the University of Technology of Troyes. Member of editorial board of 2 international journals: IJDM and IJFO, and member of organizing committee of more than 40 scientific events. Advisor of 33 PhD theses in the field of solid and structural mechanics.

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C. Labergère (UTT)

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D. Retraint
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E. Rouhaud

Many thanks to Ludovic Stiot, Arthur Ebel, Stéphane Fleury, and Thierry Adnot for their help and support.

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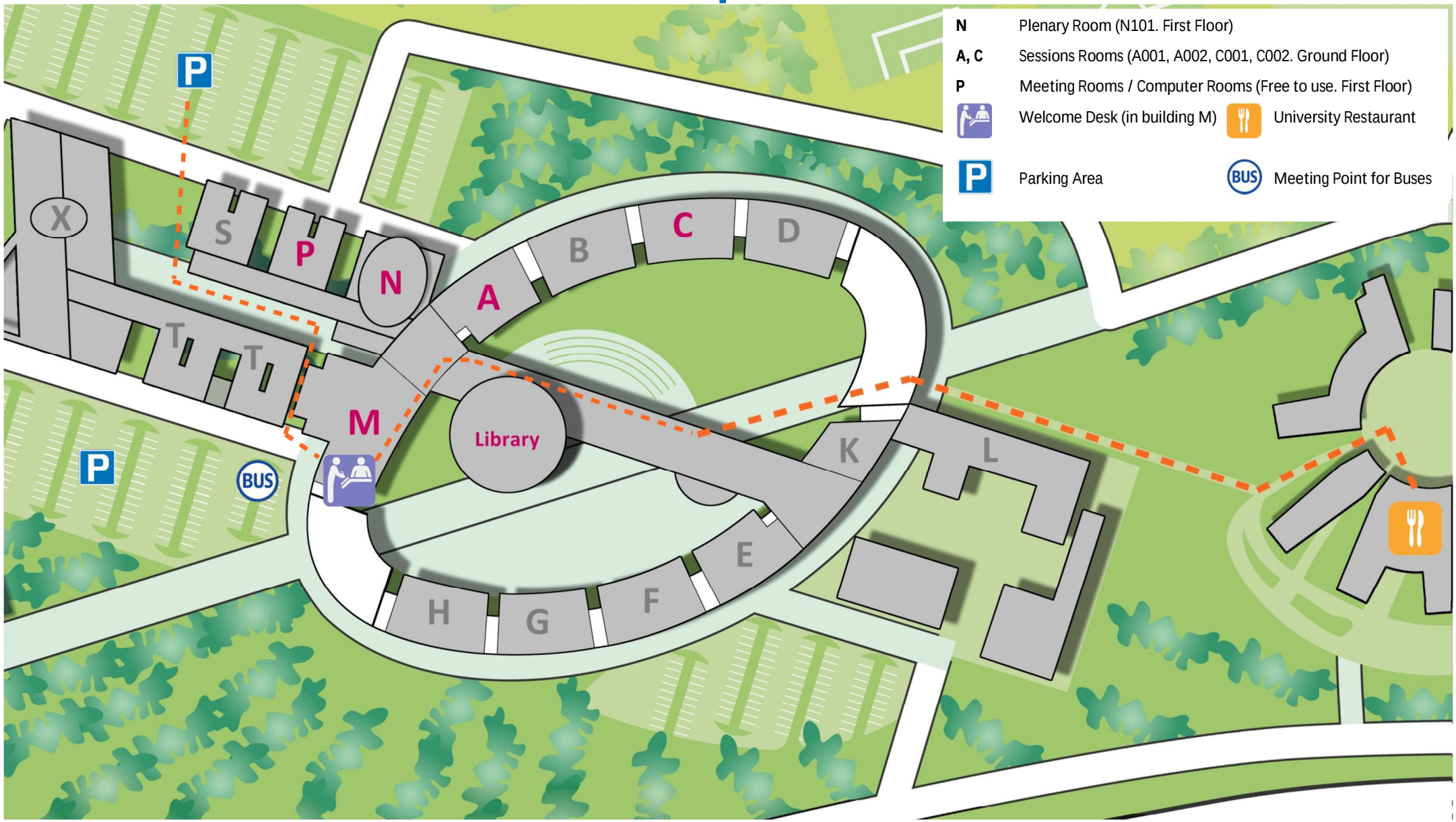
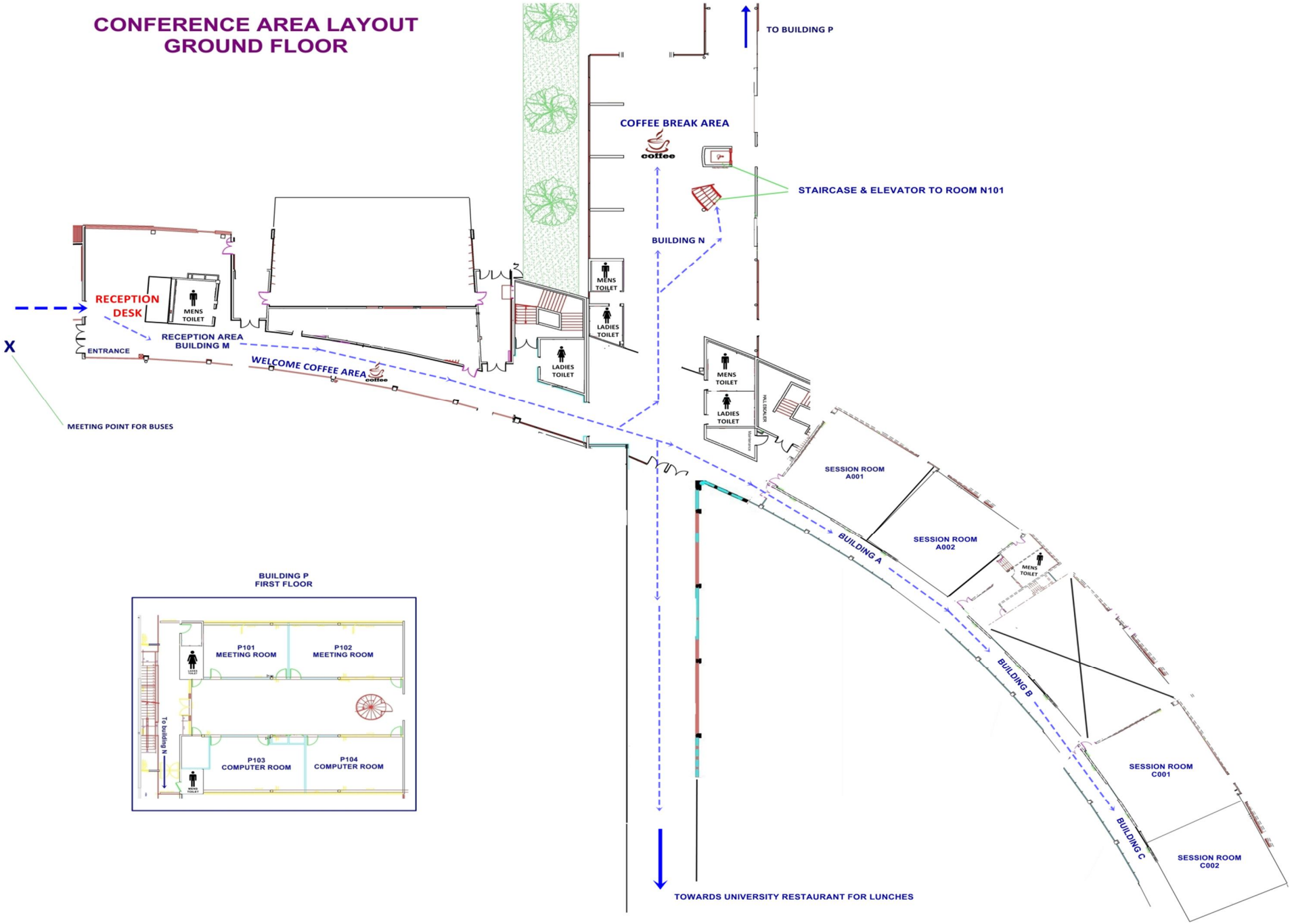
Q. Yang (China)
B. L. Wang (Australia)
S. W. Yu (China)

Site Map of UTT

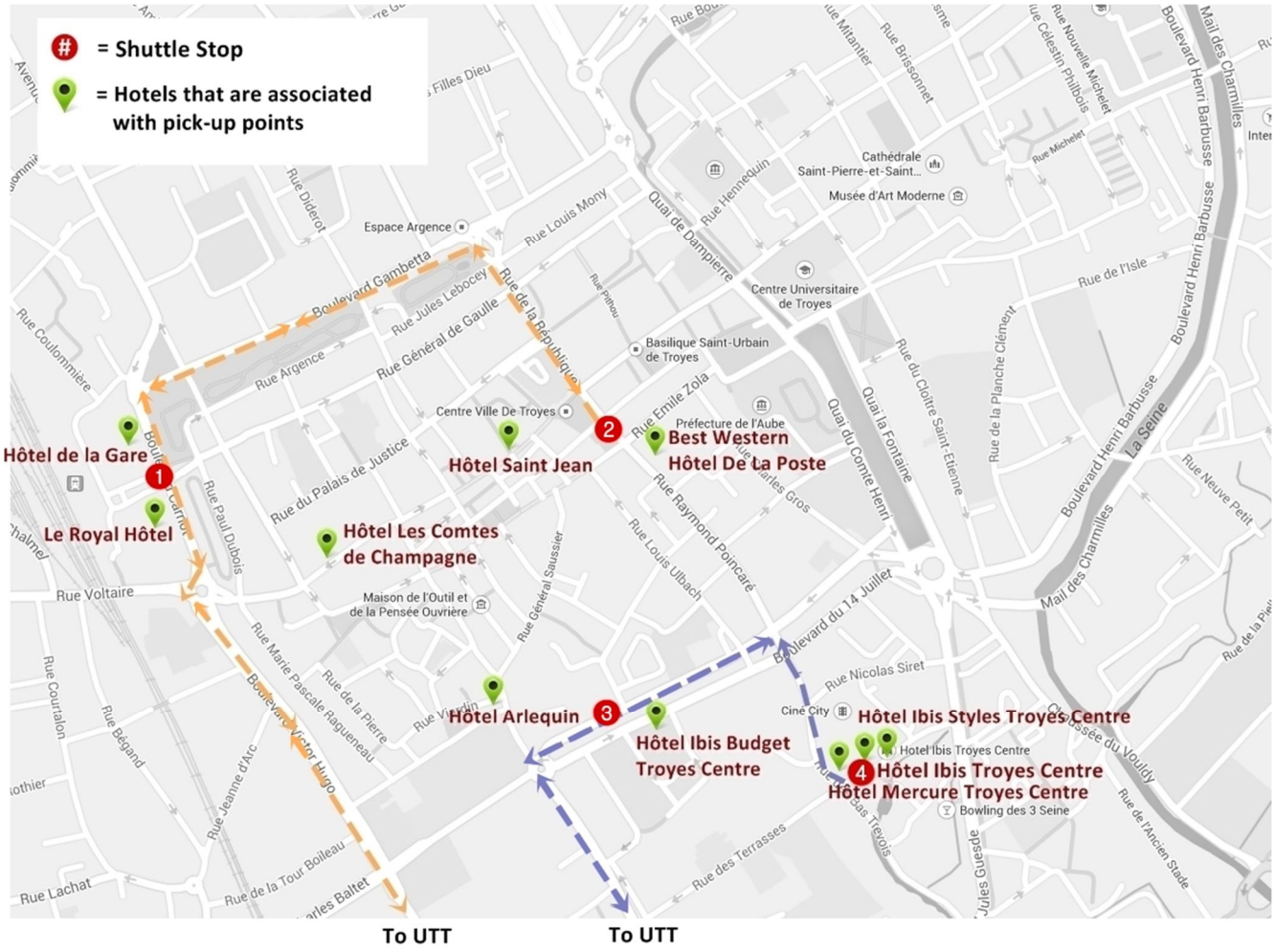


CONFERENCE AREA LAYOUT
GROUND FLOOR

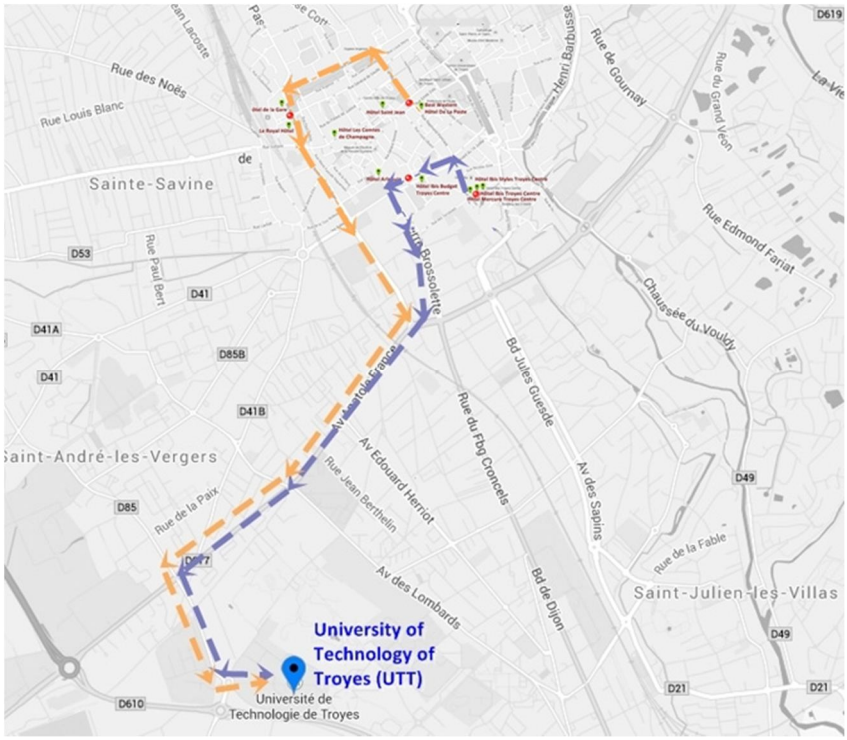


Shuttle Stops

Two shuttles will be organized twice a day, in the morning and at the end of the day to relate hotels to the UTT Campus following the two indicated paths shown on the map above.



Zoom-out mode: The following map below locates this group of hotels associated with the pick-up points with respect to the UTT Campus situated approximately 4 Kilometers from downtown, where the ICDM2 takes place.



The Schedule for the Shuttle:

Shuttle Name	Wednesday, July 8, 2015	Morning	Evening
Shuttle A	Shuttle Stop 1 (near public-bus-stop « GARE CARNOT »)	07:50	19:15
Shuttle A	Shuttle Stop 2 (near public-bus-stop in front of the townhall)	08:00	19:20
Shuttle B	Shuttle Stop 3 (at the public-bus-stop « BEURNONVILLE »)	07:50	19:15
Shuttle B	Shuttle Stop 4 (at the parking area of Hotel IBIS)	08:00	19:20
	Arrive at UTT; Depart from UTT	08:15	19:00

Shuttle Name	Thursday, July 9, 2015	Morning	Evening
Shuttle A	Shuttle Stop 1 (near public-bus-stop « GARE CARNOT »)	08:05	19:15
Shuttle A	Shuttle Stop 2 (near public-bus-stop in front of the townhall)	08:15	19:20
Shuttle B	Shuttle Stop 3 (at the public-bus-stop « BEURNONVILLE »)	08:05	19:15
Shuttle B	Shuttle Stop 4 (at the parking area of Hotel IBIS)	08:15	19:20
	Arrive at UTT; Depart from UTT	08:30	19:00

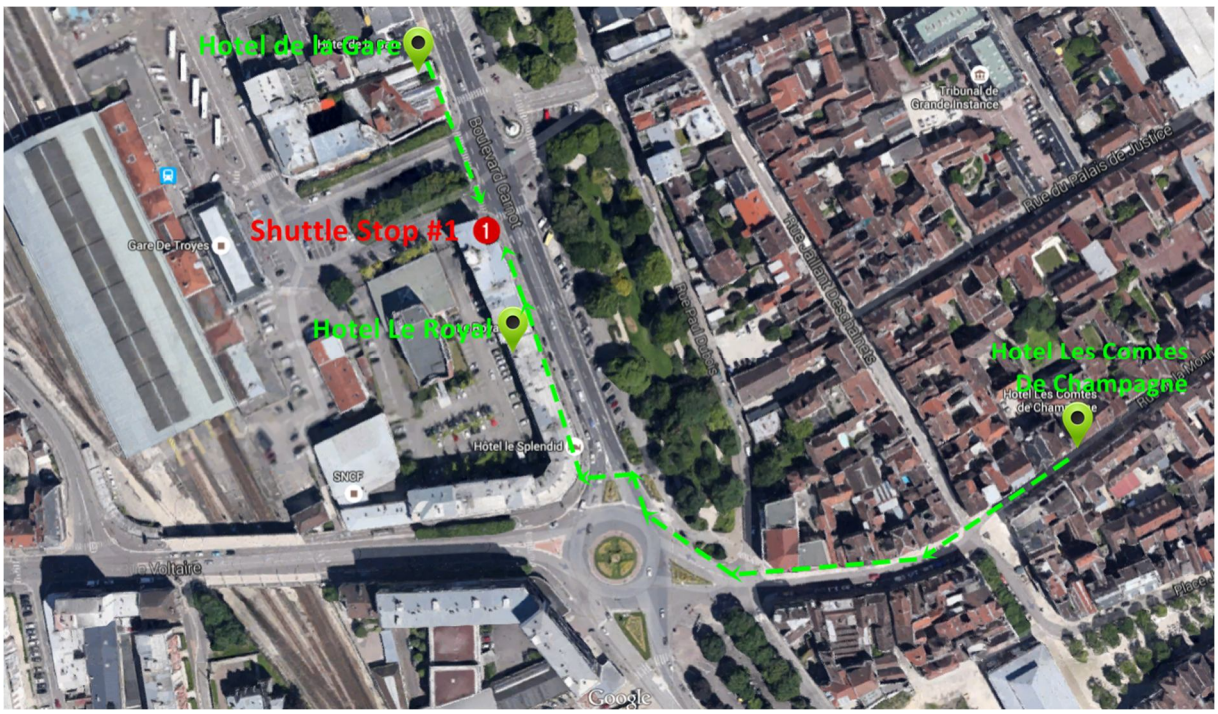
Shuttle Name	Friday, July 10, 2015	Morning	Evening
Shuttle A	Shuttle Stop 1 (near public-bus-stop « GARE CARNOT »)	08:05	19:15
Shuttle A	Shuttle Stop 2 (near public-bus-stop in front of the townhall)	08:15	19:20
Shuttle B	Shuttle Stop 3 (at the public-bus-stop « BEURNONVILLE »)	08:05	19:15
Shuttle B	Shuttle Stop 4 (at the parking area of Hotel IBIS)	08:15	19:20
	Arrive at UTT; Depart from UTT	08:30	19:00

Attention: The name of the Shuttle: **COLLARD** (it is written on the body of the shuttle like the example image on the right) and you will also see "**ICDM2**" displayed in front of it.

To know the location of the shuttle stops for each shuttle, please take a look at the maps below:

1) Shuttle Stop #1

The Shuttle Stop is located near public-bus-stop « GARE CARNOT »

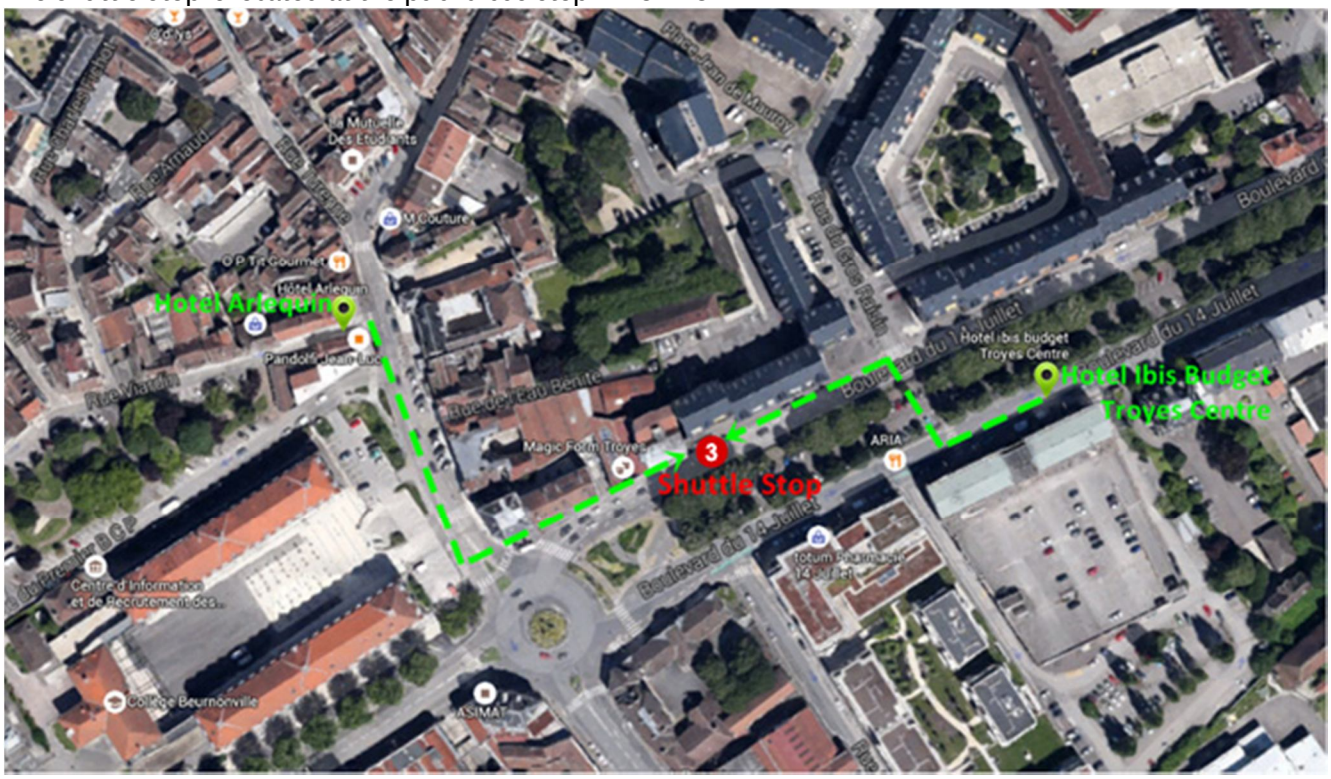


2) Shuttle Stop #2

The Shuttle Stop is located near public-bus-stop in front of the townhall.

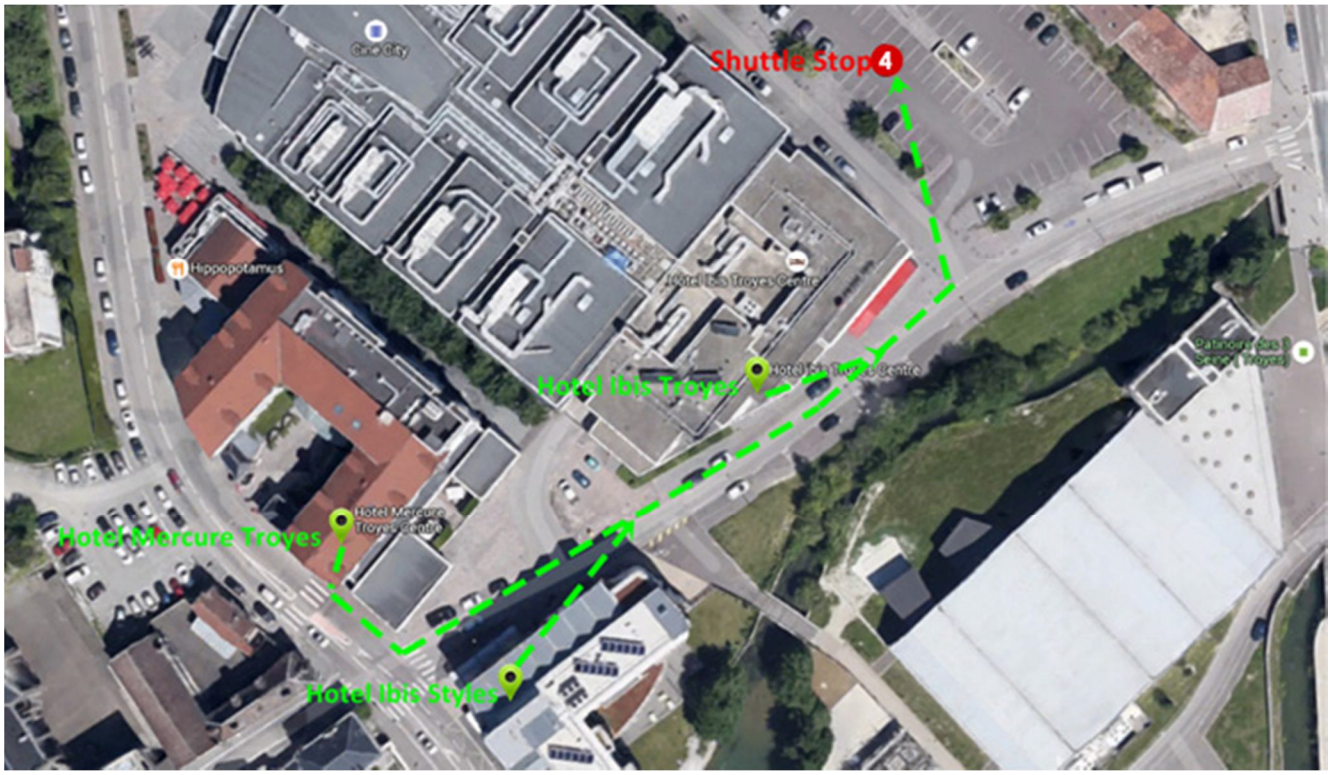
3) Shuttle Stop #3

The Shuttle Stop is located at the public-bus-stop "BEURNONVILLE"



4) Shuttle Stop #4

The Shuttle Stop is located at the parking area of Hotel IBIS.



Partners and Sponsors

The organizers are grateful to CNRS, Région Champagne-Ardenne, Conseil Général de l'Aube and Grand Troyes for their financial support.

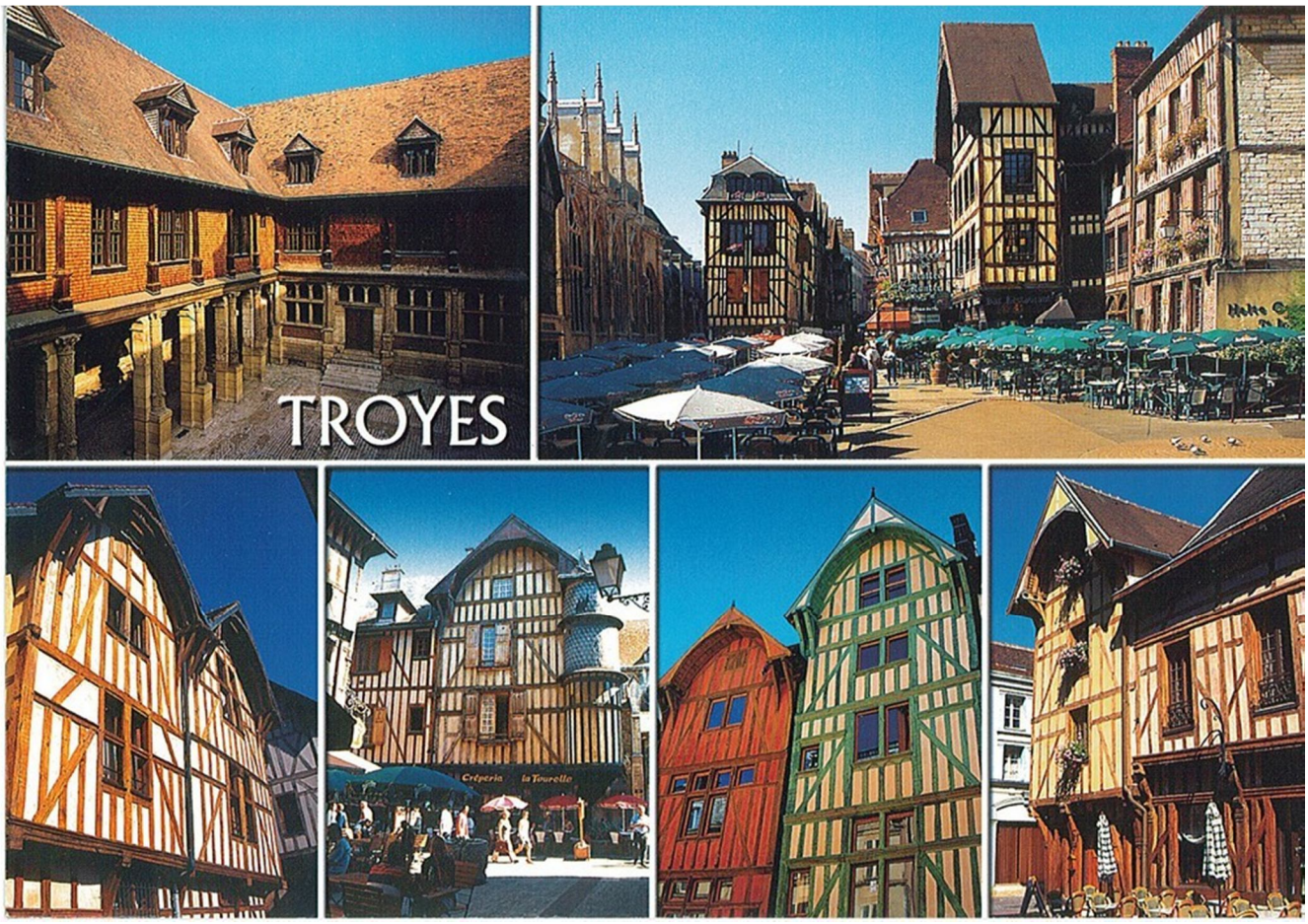
Plenary Lectures and Mini-Symposia

Plenary Lectures

Plenary 1: ID 143; Mechanical Properties of Innovative Pothole Patching Materials Featuring High-Toughness Low-Viscosity Nano-Molecular Resins **Ju, J.W.**; Yuan, K.Y. (Matt); UCLA United States July 8; 10.00 - 10:40; Room N101
Plenary 2: ID 54; ELASTOPLASTIC AND DAMAGE ANALYSIS OF TRUSSES SUBJECTED TO CYCLIC LOADING **Šumarac, D.**; Perović, Z.; Faculty of Civil Engineering Serbia July 8; 14:00 - 14:40
Plenary 3: ID 123; A GTN model for high and low triaxiality stress states; Malcher, L.; Pires, F.; **Cesar de Sa, J.**; INEGI – Institute of Mechanical Engineering and Industrial Management, Faculty of Engineering, University of Porto Portugal July 9; 09:00 - 09:40; Room N101
Plenary 4: ID 167; Enlarged finite strain modeling incorporating Adiabatic Shear Banding and post-localization microvoiding as shear failure mechanisms; **DRAGON, A.**; LONGERE, P.; Institut Pprime (UPR CNRS 3346), ISAE-ENSMA, BP 40109, F-86961 Futuroscope-Chasseneuil France; July 10; 09:00 - 09:40; Room N101
Plenary 5: ID 20; Modeling of stress-state-dependent damage and failure of ductile metals **Brünig, M.**; Brenner, D.; Gerke, S.; Universität der Bundeswehr München Germany July 10; 14:00 - 14:40; Room N101

Mini-Symposia

Mini-symposium in honor of Prof. J.L. Chaboche. **"Degradation vs Strengthening: Paradigms in Anisotropic Damage and Curing"** **Chairman: R. Desmorat (ENS, Cachan, France)**
ID 168; On Materials with Time Dependent Properties: Application to the Continuum Mechanics of Curing **Steinmann, P.**; Hossain, M.: Saxena, P.; University Erlangen-Nuremberg Germany July 9; 14:15 - 14:55; Room N101
ID 135; From JL Chaboche damage models to ODM models for CMC and their validation **Laurin, F.**; Kaminski, M.; Bouillon, F.; Maire, J.F.; ONERA, the french aerospace lab France July 9; 14:55 - 15:30; Room N101
ID 166; Second order anisotropic damage framework: from theory to applications **Desmorat, R.**; LMT-Cachan France July 9; 15:30 - 16:00; Room N101
Mini-symposium in honor of Prof. G.Z. Voyiadjis. **"Multiscale Damage Mechanics"** **Chairman: L. Sun (UCI, USA)**
ID 9; Phase Field Based Nonlocal Elasto-Plastic Damage Model **Voyiadjis, G.Z.**; Mozaffari, N. Louisiana State University United States July 9; 16:30 - 17:15; Room N101
ID 169 Innovative Strain Energy Based Thermo-Elastoviscoplastic Damage-Self Healing Model for Bituminous Pavements **Ju, J. W.**; Hong, S.; Yuan, K.Y.; UCLA United States July 9; 17:15 - 17:45; Room N101
ID 164 ;New Concepts in Continuum Damage Mechanics Voyiadjis, G.Z.; **Kattan, P.**; Independent Researcher Jordan July 9; 17:45 - 18:15; Room N101
ID 87; Interfacial Debonding and Viscoelastic Behavior of Magnetorheological Nanocomposites Damiani, R.; **Sun, L.**; UCI United States July 9; 18:15 - 18:45; Room N101


TROYES
Crêperia la Tourelle

GENERAL PROGRAM

&

LIST OF ORAL PRESENTATIONS

ICDM2 GENERAL PROGRAM

WEDNESDAY, JULY 8, 2015

08:00 - 09:30	**Registration & Welcome Coffee (Reception Area)**		
09:30 - 10:00	Opening Session (Room: N101)		
10:00 - 10:40	**Plenary 1 (Room: N101) J.W. Ju (UCLA, USA) ID 143**		
	Room A001	**Room A002**	**Room C001**
10:50 - 11:10	ID 8	ID 11	ID 65
11:10 - 11:30	ID 13	ID 100	ID 113
11:30 - 11:50	ID 32	ID 35	ID 117
11:50 - 12:10	ID 61	ID 57	ID 124
12:10 - 12:30	ID 107	ID 37	ID 130
12:30 - 13:45	Lunch		
14:00 - 14:40	**Plenary 2: (Room N101) D. Sumarac (FCEB, Serbia) ID 54**		
	Room A001	**Room A002**	**Room C001**
14:50 - 15:10	ID 16	ID 111	ID 71
15:10 - 15:30	ID 148	ID 63	ID 105
15:30 - 15:50	ID 53	ID 81	ID 137
15:50 -16:10	ID 122	ID 74	ID 154
16:10 - 16:30	Coffee Break		
	Room A001	**Room A002**	**Room C001**
16:30 - 16:50	ID 55	ID 145	ID 41
16:50 - 17:10	ID 103	ID 72	ID 83
17:10 - 17:30	ID 10	ID 56	ID 106
17:30 - 17:50	ID 147	ID 21	ID 162
17:50 - 18:10	ID 151	ID 33	ID 129
18:15-18:45	**Meeting of the ICDM directors**		
20:00-22:00	**Champagne Tasting & Welcome Buffet**		

THURSDAY, JULY 9, 2015

09:00 - 09:40	**Plenary 3 (Room: N101) J. M.A. Cesar de Sa (FE-UP, Portugal) ID 123**		
	Room A001	**Room A002**	**Room C001**
09:50 - 10:10	ID 51	ID 40	ID 30
10:10 - 10:30	ID 141	ID 58	ID 90
10:30 - 10:50	ID 60	ID 59	ID 94
10:50 - 11:10	Coffee Break		
	Room A001	**Room A002**	**Room C001**
11:10 - 11:30	ID 131	ID 28	ID 25
11:30 - 11:50	ID 152	ID 64	ID 27
11:50 - 12:10	ID 110	ID 67	ID 163
12:10 - 12:30	ID 108	ID 144	ID 159
12:30 - 13:45	Lunch		
14:00 - 16:00	**Mini-symposium in honor of Prof. J.L. Chaboche. "Degradation vs Strengthening: Paradigms in Anisotropic Damage and Curing" Chairman: R. Desmorat (ENS, Cachan, France) Plenary lectures (Room: N101)**		
14:00 - 14:15	Special Speech		
14:15 - 14:55	ID 168: P. Steinmann		
14:55 - 15:30	ID 135: F. Laurin et al		
15:30 - 16:00	ID 166: R. Desmorat		
16:00 - 16:30	Coffee Break		
16:30 - 18:45	**Mini-symposium in honor of Prof. G.Z. Voyiadjis. "Multiscale Damage Mechanics" Chairman: L. Sun (UCI, USA) Plenary lectures (Room: N101)**		
16:30 - 17:15	ID 9: G. Z. Voyiadjis		
17:15 - 17:45	ID 169: J.W. Ju		
17:45 - 18:15	ID 164: P. Kattan		
18:15 - 18:45	ID 87: L. Sun		
20:00-23:00	**Banquet + ICDM Trophies for Honored Scientists + Announcement of ICDM3 (2018)**		

FRIDAY, JULY 10, 2015

09:00 - 09:40	**Plenary 4 (Room: N101) A. Dragon (ENSMA, France) ID 167**			
	Room A001	**Room A002**	**Room C001**	**Room C002**
09:50 - 10:10	ID 38	ID 99	ID 66	ID 88
10:10 - 10:30	ID 92	ID 42	ID 82	ID 120
10:30 - 10:50	ID 116	ID 45	ID 93	ID 36
10:50 - 11:10	Coffee Break			
	Room A001	**Room A002**	**Room C001**	**Room C002**
11:10 - 11:30	ID 140	ID 46	ID 26	ID 118
11:30 - 11:50	ID 139	ID 84	ID 95	ID 48
11:50 - 12:10	ID 155	ID 19	ID 102	ID 68
12:10 - 12:30	ID 133	ID 23	ID 121	ID 73
12:30 - 13:45	Lunch			
14:00 - 14:40	**Plenary 5 (Room: N101) M. Brünig (UBM, Germany) ID 20**			
	Room A001	**Room A002**	**Room C001**	**Room C002**
14:50 - 15:10	ID 17	ID 91	ID 114	ID 115
15:10 - 15:30	ID 127	ID 34	ID 146	ID 76
15:30 - 15:50	ID 47	ID 75	ID 77	ID 136
15:50 -16:10	ID 138	ID 80	ID 170	ID 52
16:10-16:30	ID 171	ID 98	ID 101	ID 70
16:30	Coffee Break and Conference Closure			
16:30	Laboratory Visit			

SATURDAY, JULY 11, 2015

09:00	**Free Program** -Visit of Troyes -Downtown visit of the factory outlets (sales period)

Theme 1: Theoretical modeling in damage mechanics

Theme 2: Numerical simulation in damage mechanics

Theme 3: Experimentation and engineering application

Plenary Sessions

List of 124 Oral Presentations including 12 Plenary Lectures ordered by ID number

ID	Title	Author(s)	Organization	Country	Theme	Day	Hour	Room
8	Complex Damage Variables in Continuum Damage Mechanics	Voyiadjis, G.Z. Kattan, P.	Louisiana State University	United States	Theme 1: Theoretical modeling in damage mechanics	July 8	10:50 - 11:10	A001
9	Phase Field Based Nonlocal Elasto-Plastic Damage Model	Voyiadjis, G.Z. Mozaffari, N.	Louisiana State University	United States	Plenary Session, MS/Voyiadjis	July 9	16:30 - 17:15	N101
10	Using of anisotropic continuum damage mechanics to describe yield surface distortion	Nayebi, A. Hojjatollah, R.	Shiraz University	Iran	Theme 1: Theoretical modeling in damage mechanics	July 8	17:10 - 17:30	A001
11	Recent Advances in Simulating Failure Evolution with the Material Point Method	Chen, Z. Zhang, X.	Dalian University of Technology / University of Missouri	United States	Theme 2: Numerical Simulation in damage mechanics	July 8	10:50 - 11:10	A002
13	A creep damage model for rock mass based on internal variable theory	Liu, Y. Zhang, L. Yang, Q	Tsinghua University	China	Theme 1: Theoretical modeling in damage mechanics	July 8	11:10 - 11:30	A001
~~15~~	~~A Simplified Model for Numerical Study of Polyurethane Foaming in Porous Media ==> WITHDRAWN~~	~~Sadrhosseini, H Bazkhane, S.~~	~~Sharif University of Technology, International Campus~~	~~Iran~~	~~Theme 1: Theoretical modeling in damage mechanics~~	~~July 10~~	~~15:30 - 15:50~~	~~A001~~
16	Using Entropy Production Rate as a Metric for a Universal Damage Model	Basaran, C.	State University of New York at Buffalo	United States	Theme 1: Theoretical modeling in damage mechanics	July 8	14:50 - 15:10	A001
17	Phenomenological modelling of impact toughness transition behaviour	Münstermann, S. Kucharczyk, P. Golisch, G. Döbereiner, B.	Forschungszentrum Jülich GMBH	Germany	Theme 1: Theoretical modeling in damage mechanics	July 10	14:50 - 15:10	A001
19	A simple kinematical model of frame-masonry shear-wall systems	Di Nino, S. D'Annibale, F. Luongo, A	International Research Center on Mathematics and Mechanics of Complex Systems	Italy	Theme 2: Numerical Simulation in damage mechanics	July 10	11:50 - 12:10	A002
20	Modeling of stress-state-dependent damage and failure of ductile metals	Brünig, M. Brenner, D. Gerke, S.	Universität der Bundeswehr München	Germany	Plenary lecture	July 10	14:00 - 14:40	N101
21	A micro-cell size dependent damage law of concrete	Liang, S. Ren, X. Li, J.	Tongji University	China	Theme 2: Numerical Simulation in damage mechanics	July 8	17:50 - 18:10	A002
23	Damage Index Proposals Applied to Quasi-Fragile Materials Simulated Using the Lattice Discrete Element Method	Rodrigues, R. Birck, G. Iturrioz, I. Avila, L.R.	Ufrgs	Argentina	Theme 2: Numerical Simulation in damage mechanics	July 10	12:10 - 12:30	A002
25	On the role of in-plane damage mechanisms on the macroscopic behavior of SiC/SiC composites from complementary 2D and 3D in-situ investigations	CHEN, Y. BERNACHY-BARBE, F. GELEBART, L. BORNERT, M. CHÂTEAU, C. KING, A. SAUDER, C.	CEA	France	Theme 3: Experimentation and engineering application	July 9	11:10 - 11:30	C001

26	Experimental Verification of a Thermodynamic Fatigue Life Prediction Model	Fogang, T.A.T. Basaran, C.	Department of Mechanical and Aerospace Engineering, State University of New York at Buffalo	United States	Theme 3: Experimentation and engineering application	July 10	11:10 - 11:30	C001
27	A macroscopic modeling of SiC/SiC composites derived from experimental micromechanics	BERNACHY-BARBE, F. GELEBART, L. BORNERT, M. CREPIN, J. SAUDER, C.	CEA	France	Theme 3: Experimentation and engineering application	July 9	11:30 - 11:50	C001
28	Different Numerical Time Integration Schemes for Elastoplasticity Coupled to Anisotropic Damage	Fassin, M. Wulfinghoff, S. Reese, S.	Institute of Applied Mechanics	Germany	Theme 2: Numerical Simulation in damage mechanics	July 9	11:10 - 11:30	A002
30	Influence of residual stresses on the damage of composite laminates under tensile loading	Wen, Z. Gong, X.L.	Université de Technologie de Troyes	France	Theme 3: Experimentation and engineering application	July 9	09:50 - 10:10	C001
32	Radiation induced damage in ductile materials subjected to time-dependent stresses	Skoczen, B. Ustrzycka, A.	Cracow University of Technology, Institute of Applied Mechanics	Poland	Theme 1: Theoretical modeling in damage mechanics	July 8	11:30 - 11:50	A001
33	Chemistry of crack initiation in amorphous silicon	Tabatabaei, M. Shodja, H.	Sharif University of Technology	Iran	Theme 2: Numerical Simulation in damage mechanics	July 8	16:50 - 17:10	A002
34	Damage Accumulation and Fracture of Weld Joints under Low- Cyclic Loading Conditions Loading Conditions	Kornev, V.M.	Lavrentyev Institute of Hydrodynamics SB RAS	Russian Federation	Theme 3: Experimentation and engineering application	July 10	15:10 - 15:30	A002
35	FAILURE SURFACE VARIATION OBTAINED WITH THE TRUSS-LIKE DISCRETE ELEMENT METHOD	Silva, G.S.D. Fernandes, F.G. Colpo, A.B. Puglia, V.B. Kosteski, L.E.		Brazil	Theme 2: Numerical Simulation in damage mechanics	July 8	11:30 - 11:50	A002
36	High cycle fatigue (HCF) model for unreinforced and reinforced thermoplastic polymers	KRAIRI, A. DOGHRI, I GUDIMETLA, M.	Université Catholique de Louvain	Belgium	Theme 1: Theoretical modeling in damage mechanics	July 10	10:30 - 10:50	C002
37	Micromechanical damage simulation to obtain effect of coarse grains distribution on mechanical properties of bimodal AL using 2D XFEM	Hosseini-Toudeshky, H. Jamalian, M.	Amirkabir University of Technology	Iran	Theme 2: Numerical Simulation in damage mechanics	July 8	11:50 - 12:10	A002
38	Damage Theory Based Fatigue Simulation of Concrete Structure	Liang, J. Li, J.	Department of Structural Engineering, College of Civil Engineering, Tongji University	China	Theme 1: Theoretical modeling in damage mechanics	July 10	09:50 - 10:10	A001
40	Mathematical and numerical modelling of large axisymmetric creep strains and damage	Szuwalski, K. Ustrzycka, A.	Cracow University of Technology, Institute of Applied Mechanics	Poland	Theme 2: Numerical Simulation in damage mechanics	July 9	09:50 - 10:10	A002
41	Effect of crack closure parameter and negative triaxiality on damage growth in upsetting problem	Kumar, M. Dixit, P.M.	Indian Institute of Technology Kanpur	India	Theme 3: Experimentation and engineering application	July 8	16:30 - 16:50	C001
42	A dynamic damage law with internal length to model localized failure	Keita, O. FRANCOIS, B.	Université Libre de Bruxelles	Belgium	Theme 2: Numerical Simulation in damage mechanics	July 10	10:10 - 10:30	A002

45	Numerical modeling of crack growth in interpenetrating metal-ceramic composites	Poniżnik, Z. Nowak, Z. Basista, M.	Institute of Fundamental Technological Research, Polish Academy of Sciences	Poland	Theme 2: Numerical Simulation in damage mechanics	July 10	10:30 - 10:50	A002
46	MULTISCALE MODELING OF DAMAGE AND FAILURE IN A BIOLOGICAL HIERARCHICAL MATERIAL	Scheider, I. Xiao, T. Yilmaz, E. Schneider, G.A. Huber, N. Bargmann, S.	Institute of Materials Research, Helmholtz-Zentrum Geesthacht, Material Mechanics	Germany	Theme 2: Numerical Simulation in damage mechanics	July 10	11:10 - 11:30	A002
47	Effect of the manufacturing parameters on the defects in the open cell aluminum foam	Zhu, F. Poulet, J. He, S. Gong, X.L.	University of Technology of Troyes	France	Theme 1: Theoretical modeling in damage mechanics	July 10	15:50 - 16:10	A001
48	Experimental study and multi-scales modeling of mechanical behavior of polycrystalline materials during ductile damage	Zhao, Y. Le Joncour, L. Baczmański, A. François, M. Panicaud, B. Wroński, S. Gadalińska, E. Braham, C. Buslaps, T.	Université de Technologie de Troyes	France	Theme 3: Experimentation and engineering application	July 10	11:30 - 11:50	C002
51	Stability Analysis of Wave Propagation in Softening Solids	Ren, X. Li, J.	Tongji University	China	Theme 1: Theoretical modeling in damage mechanics	July 9	09:50 - 10:10	A001
52	Numerical Simulation of Failure Process in FRP Concrete Structures	Mazzucco, G. Pellegrino, C. Majorana, C. Salomoni, V.	University of Padua	Italy	Theme 3: Experimentation and engineering application	July 10	15:50 - 16:10	C002
53	On the use of the generalized eigenstrain method in the modeling of coupling between damage and corrosion	Panicaud, B.	UTT	France	Theme 1: Theoretical modeling in damage mechanics	July 8	15:30 - 15:50	A001
54	ELASTOPLASTIC AND DAMAGE ANALYSIS OF TRUSSES SUBJECTED TO CYCLIC LOADING	Šumarac, D. Perović, Z.	Faculty of Civil Engineering	Serbia	Plenary lecture	July 8	14:00 - 14:40	N101
55	ON ELASTICITY TENSOR OF ANISOTROPIC DAMAGE MECHANICS	Jarić, J. Kuzmanović, D. Šumarac, D.	Faculty of Matematics, University of Belgrade	Serbia	Theme 1: Theoretical modeling in damage mechanics	Juli 8	16:30 - 16:50	A001
56	Heterogeneous Lattice Model Based Simulation of Concrete under Uniaxial Loading	Yan, X. Li, J. Ren, X		China	Theme 2: Numerical Simulation in damage mechanics	July 8	17:30 - 17:50	A002
57	Impact Failure analysis of RC beam using SPH method based on damage theory	Sonoda, Y.	Kyushu University	Japan	Theme 2: Numerical Simulation in damage mechanics	July 8	12:10 - 12:30	A002
58	Coupled damage-plasticity modelling of ductile failure in an aluminium alloy	Nguyen, G.D. Korsunsky, A.M. Belnoue, J.	MBLEM, Department of Engineering Science, University of Oxford	United Kingdom	Theme 2: Numerical Simulation in damage mechanics	July 9	10:10 - 10:30	A002

59	Recent Developments in Modeling of Progressive Damage in Fiber-Reinforced Composites	Chen, B.Y. Tay, T.E.	National University of Singapore	Singapore	Theme 2: Numerical Simulation in damage mechanics	July 9	10:30 - 10:50	A002
60	Elastostatic fields of an embedded circular rigid nano/micro-fiber with interfacial damage in anti-plane couple stress elasticity	Hashemian, B. Shodja, H.M. Goodarzi, A.	Sharif University of Technology	Iran	Theme 1: Theoretical modeling in damage mechanics	July 9	10:30 - 10:50	A001
61	Multi-phase modelling of concrete affected by sulfate attack	Cefis, N. Comi, C.	Politecnico di Milano	Italy	Theme 1: Theoretical modeling in damage mechanics	july 8	11:50 - 12:10	A001
63	Adaptive zooming method for the simulation of quasi-brittle materials	Llau, A. Jason, L. Baroth, J. Dufour, F.	CEA, DEN/DANS/DM2S/SEMT/LM2S, 91191 Gif sur Yvette	France	Theme 2: Numerical Simulation in damage mechanics	July 8	15:10 - 15:30	A002
64	Comparison of Two Time-Integration Algorithms for an Anisotropic Damage Model Coupled With Plasticity	Wulfinghoff, S. Fassin, M. Reese, S.	RWTH Aachen	Germany	Theme 2: Numerical Simulation in damage mechanics	July 9	11:30 - 11:50	A002
65	Using Acoustic Emission Monitoring to Observe the De-bonding Behavior of Rebar in Cyclic Pull-Out Tests	Pei, K.C. Kan, Y.C.	Institute of Nuclear Energy Research (INER)	Taiwan	Theme 3: Experimentation and engineering application	July 8	10:50 - 11:10	C001
66	Parameter identification of a damage model for the lifetime prediction of adhesively bonded joints	Kroll, U. Matzenmiller, A.	University of Kassel	Germany	Theme 3: Experimentation and engineering application	July 10	09:50 - 10:10	C001
67	Prediction of low cycle fatigue life using cycles jumping integration scheme	Labergere, C. Saanouni, K. Sun, Z. Dhifallah M.A. Li, Y. Duval, J.L.	UTT, ICD/LASMIS UMR CNRS 6281	France	Theme 2: Numerical Simulation in damage mechanics	July 9	11:50 - 12:10	A002
68	Analysis and modeling ot carbonitrided steel components fracture process	Karolak, C Bouchard, P.O. Montmitonnet, P. Delattre, G. Parks, D.	Mines Paristech, PSL Research University, CEMEF	France	Theme 3: Experimentation and engineering application	July 10	11:50 - 12:10	C002
70	PCM inclusions in concrete materials for thermal storage problems	Xotta, G. Mazzucco, G. Majorana, C. Salomoni, V. Giannuzzi, M. Miliozzi, A.	University of Padua	Italy	Theme 3: Experimentation and engineering application	July 10	16:10 - 16:30	C002
71	Fatigue analysis in adhesive joints	Martinez, J.F.T. Rodriguez , J.P.C. Prieto, P.A.	Universidad de los Andes	Colombia	Theme 3: Experimentation and engineering application	July 8	14:50 - 15:10	C001
72	Numerical simulation based on mixed MESHLESS/MEF formulation. Application to solid mechanics with ductile damage.	LABERGERE, C. GHOZZI, Y VILLON, P SAANOUNI, K	UTT, ICD/LASMIS UMR CNRS 6281	France	Theme 2: Numerical Simulation in damage mechanics	July 8	17:10 - 17:30	A002
73	Experimental identification of damage mechanism in metallic materials used for particle accelerators	Tabin, J. Skoczeń, B.	Institute of Applied Mechanics, Cracow University of Technology	Poland	Theme 3: Experimentation and engineering application	July 10	12:10 - 12:30	C002

74	Nonlocal Continuum Damage Mechanics approach of a discrete axial chain under non-uniform axial load	Herisson, B. Picandet, V. Challamel, N. Perrot, A.	Université de Bretagne Sud	France	Theme 2: Numerical Simulation in damage mechanics	July 8	15:50 - 16:10	A002
75	A study on the collapse mechanism of high strength concrete columns apply to fiber-cocktail	Kwon, K.S. Kim, H.Y. Chae, S.U. Cho, B.Y.	Fire Research center, KOREA INSTITUTE of CIVIL ENGINEERING and BUILDING TECHNOLOGY	Korea, Republic Of	Theme 3: Experimentation and engineering application	July 10	15:30 - 15:50	A002
76	Experimental study on horizontal shear crack control of prestressed corrugated composite beams	Chae, S.U. Cho, B.Y. Kweon, O.S. Kim, H.Y	Fire Research center, KOREA INSTITUTE of CIVIL ENGINEERING and BUILDING TECHNOLOGY	Korea, Republic Of	Theme 3: Experimentation and engineering application	July 10	15:10 - 15:30	C002
77	A Study on the Microstructure of Welded Structural Steel Members at High Temperature	Cho, B.Y. Kim, H.Y. Yang, S.C. Chae, S.U.	Fire Research center, KOREA INSTITUTE of CIVIL ENGINEERING and BUILDING TECHNOLOGY	Korea, Republic Of	Theme 3: Experimentation and engineering application	July 10	15:30 - 15:50	C001
80	Effects of sandblasting on surface morphology and contact properties	ZHAI, C. GAN, Y. Hanaor, D.	The University of Sydney	Australia	Theme 3: Experimentation and engineering application	July 10	15:50 - 16:10	A002
81	Methods for Damage Analysis of Steel Structures	Heinrich, S. Kowalsky, U. Dinkler, D.	Institute for Structural Analysis	Germany	Theme 2: Numerical Simulation in damage mechanics	July 8	15:30 - 15:50	A002
82	Influence of the stress state on the predictability of the failure probability in the Beremin model	Golisch, G. Münstermann, S. Bleck, B.	RWTH Aachen University	Germany	Theme 3: Experimentation and engineering application	July 10	10:10 - 10:30	C001
83	Modelling of chip breakage in machining process with damage mechanics model	Wu, B. Yan, Y. Münstermann, S.	RWTH Aachen University	Germany	Theme 3: Experimentation and engineering application	July 8	16:50 - 17:10	C001
84	Modelling of damage and failure in High Mn TWIP Steels	Madivala, M. Bleck, W. Prahl, U.	Steel Institute, RWTH Aachen University	Germany	Theme 2: Numerical Simulation in damage mechanics	July 10	11:30 - 11:50	A002
87	Interfacial Debonding and Viscoelastic Behavior of Magnetorheological Nanocomposites	Damiani, R. Sun, L.	UCI	United States	Plenary Session, MS/Voyiadjis	July 9	18:15 - 18:45	N101
88	Analysis of casting materials under thermal fatigue	Altenbach, H. Längler, F. Naumenko, K. Ievdokymov, M	Otto-von-Guericke-Universität Magdeburg	Germany	Theme 1: Theoretical modeling in damage mechanics	July 10	09:50 - 10:10	C002
90	FE analysis of flexural behavior of externally bonded CFRP reinforced timber beams	KHELIFA, M. THI, V.D.	University of Lorraine	France	Theme 3: Experimentation and engineering application	July 9	10:10 - 10:30	C001
91	Damage evolution in a circular bar undergoing phase transformation induced by torsion at cryogenic conditions	Ortwein, R. Skoczeń, B.	Cracow University of Technology	Poland	Theme 3: Experimentation and engineering application	July 10	14:50 - 15:10	A002

92	Numerical analysis of laminated veneer lumber panels in fire	THI, V.D. KHELIFA, M. EL GANAOUI, M. ROGAUME, Y.	University of Lorraine	France	Theme 1: Theoretical modeling in damage mechanics	July 10	10:10 - 10:30	A001
93	Development of unified viscoplastic-damage model for crashworthiness analysis of boron steel safety components with tailored microstructures	Li, N. Lin, J. Dean, T.	Department of Mechanical Engineering, Imperial College London	United Kingdom	Theme 3: Experimentation and engineering application	July 10	10:30 - 10:50	C001
94	Validation of micro-meso electrical relations for laminates with varying anisotropy	Selvakumaran, L. Lubineau, G.	COHMAS / PSE DIVISION / KAUST	Saudi Arabia	Theme 3: Experimentation and engineering application	July 9	10:30 - 10:50	C001
95	Probabilistic weibull methodology for fracture prediction of brittle and ductile materials	Muñiz-Calvente, M. Fernández-Canteli, A. Shlyannikov, V. Castillo, E.	Dep. of Construction and Manufacturing Engineering University of Oviedo	Spain	Theme 3: Experimentation and engineering application	July 10	11:30 - 11:50	C001
98	Damage and low-cycle fatigue of the structural materials under program loading	Bobyr, M. Khalimon, O.	National Technical University of Ukraine "Kyiv Polytechnic Institute"	Ukraine	Theme 3: Experimentation and engineering application	July 10	16:10 - 16:30	A002
99	On thermodynamics for meso-mechanically informed damage-healing-plasticity of granular media	Li, X. Du, Y. Duan, Q. Woody Ju, J.	Dalian University of Technology	China	Theme 2: Numerical Simulation in damage mechanics	July 10	09:50 - 10:10	A002
100	Multiresolution Fatigue Damage Analysis	Chow, C.L. Shen, J. Chen, H.	University of Michigan--Dearborn	United States	Theme 2: Numerical Simulation in damage mechanics	July 8	11:10 - 11:30	A002
101	Assessment of creep damage in Cr-Mo ferritic steels under multiaxial state of stress	Goyal, S. Laha, K. Bhaduri, A.K.	Indira Gandhi Centre for Atomic Research, Kalpakkam	India	Theme 3: Experimentation and engineering application	July 10	16:10 - 16:30	C001
102	Comparison of conventional mechanical testing with innovative techniques for determination of mechanical properties of nuclear power plant components materials	Stefan, J. Kopřiva, R. Eliášová, I. Siegl, J.	UJV Rez, a. s	Czech Republic	Theme 3: Experimentation and engineering application	July 10	11:50 - 12:10	C001
103	Brittle damage in initially anisotropic materials: a model accounting for the induced anisotropy and unilateral effects	Welemane, H. Goidescu, C. Kondo, D. Pantalé, O. Karama, M.	Université de Toulouse; INP/ENIT	France	Theme 1: Theoretical modeling in damage mechanics	July 8	16:50 - 17:10	A001
105	Failure mechanisms in high strength steel under impact loading: from ASB to full fracture	Roux, E. Longère, P. Cherrier, O. Millot, T. Capdeville, D. Petit, J.	Université de Toulouse, Institut Supérieur de l'Aéronautique et de l'Espace (ISAE), Institut Clément Ader (ICA EA 814), Toulouse, France	France	Theme 3: Experimentation and engineering application	July 8	15:10 - 15:30	C001

106	Strain-based continuum damage mechanics model for predicting FLC of AA5754 under warm forming conditions	Mohamed, M. Shi, Z. Lin, J. Dean, T. Dear, J	Imperial College London	United Kingdom	Theme 3: Experimentation and engineering application	July 8	17:10 - 17:30	C001
107	Cohesive Zone Damage-Healing Model for Self-Healing Materials	Abu Al-Rub, R.K. Alsheghri, A.	Masdar Institute of Science and Technology	United Arab Emirates	Theme 1: Theoretical modeling in damage mechanics	July 8	12:10 - 12:30	A001
108	Microstructural Modeling of Dual Phase Steel using a Higher-Order Gradient Plasticity-Damage Model	Abu Al-Rub, R.K. Abid, N.H. Ettehad, M. Palazotto, A.N.	Masdar Institute of Science and Technology	United Arab Emirates	Theme 1: Theoretical modeling in damage mechanics	July 9	11:50 - 12:10	A001
110	Micromechanics-based non-local damage model with gradient of strain	Oliver-Leblond, C. Dumontet, H. Kondo, D.	Université Pierre et Marie Curie	France	Theme 1: Theoretical modeling in damage mechanics	July 9	11:30 - 11:50	A001
111	From damage to fracture a modelisation based on moving discontinuities and layers	Stolz, C.	CNRS UMR 6183, UMR 8193	France	Theme 2: Numerical Simulation in damage mechanics	July 8	14:50 - 15:10	A002
113	Statistical laws of dynamic fragmentation of ZrO_2 ceramics.	Davydova, M. Uvarov, S. Chudinov, V	Institute of Continuous Media Mechanics UB RAS	Russian Federation	Theme 3: Experimentation and engineering application	July 8	11:10 - 11:30	C001
114	Environment Effects on Thermal Fatigue Damage of “AISI H11” Hot Work Tool Steel	SALEM, M. LE ROUX, S. REZAI-ARIA, F.	ICAA-Mines Albi	France	Theme 3: Experimentation and engineering application	July 10	14:50 - 15:10	C001
115	A coupled thermomechanical simulation of the failure of thermal barrier coatings of turbine blades	Rakotomalala, N. Feyel, F. Roos, A.	Safran CRT	France	Theme 3: Experimentation and engineering application	July 10	14:50 - 15:10	C002
116	Comparison of crack-width prediction models for steel-reinforced concrete structures	Tran, H. Li, C.Q. Setunge, S.	School of Civil, Environmental and Chemical Engineering, RMIT University, Australia	Australia	Theme 1: Theoretical modeling in damage mechanics	July 10	10:30 - 10:50	A001
117	In-situ dynamic experiments and modeling in multiscale kinetics of damage-failure transition	Naimark, O.	Institute of Continuous Media Mechanics of Russian Academy of SCiences	Russian Federation	Theme 3: Experimentation and engineering application	July 8	11:30 - 11:50	C001
118	Application of a Local Continuum Damage Model to Porous TRIP-Steel	Seupel, A. Kuna, M.	Institute of Mechanics and Fluid Dynamics, TU Bergakademie Freiberg	Germany	Theme 3: Experimentation and engineering application	July 10	11:10 - 11:30	C002
120	Approximate yield criterion for porous cubic and hexagonal single crystals	Paux, J. Brenner, R. Kondo, D.	Institut Jean Le Rond D'alembert upmc	France	Theme 1: Theoretical modeling in damage mechanics	July 10	10:10 - 10:30	C002
121	On the Failure Mechanisms in Reactor Pressure Vessel with Austenitic Cladding	Stefan, J. Siegl, J. Kytka, M. Brumovsky, M.	UJV Rez plc	Czech Republic	Theme 3: Experimentation and engineering application	July 10	12:10 - 12:30	C001
122	THERMODYNAMIC MODELING OF DAMAGE IN TWO-PHASE MATERIALS	Egner, H. Ryś, M.	Institute of Applied Mechanics, Cracow University of Technology	Poland	Theme 1: Theoretical modeling in damage mechanics	July 8	15:50 - 16:10	A001

123	A GTN model for high and low triaxiality stress states	Malcher, L. Pires, F. Cesar de Sa, J.	INEGI – Institute of Mechanical Engineering and Industrial Management, Faculty of	Portugal	Plenary lecture	July 9	09:00 - 09:40	N101
124	Evaluation of cumulative damage of RC members under repeated impact loading	Tamai, H. Sonoda, Y.	Kyushu University	Japan	Theme 3: Experimentation and engineering application	July 8	11:50 - 12:10	C001
127	A simplified hybrid approach for damage and failure predictions in composite plates with large cuts	JULIEN, C. HUCHETTE, C. LAURIN, F	ONERA	France	Theme 1: Theoretical modeling in damage mechanics	July 10	15:10 - 15:30	A001
129	Effect of freeze-thaw cycles on mechanical behaviors of ceramist concrete under impact loading	Chen, J. Qiu, X. Shi, G. Chen, B.	Faculty of Mechanical Engineering and Mechanics, Ningbo University	China	Theme 3: Experimentation and engineering application	Juli 8	17:50 - 18:10	C001
130	Influence of specimen geometry on strain localization phenomena in steel sheets	Bao, C. Francois, M. Le Joncour, L	Universite de Technologie de Troyes	France	Theme 3: Experimentation and engineering application	July 8	12:10 - 12:30	C001
131	The micromorphic approach to gradient plasticity and damage with appliation to crack propagation in single crystals	Forest, S.	Mines ParisTech CNRS	France	Theme 1: Theoretical modeling in damage mechanics	July 9	11:10 - 11:30	A001
133	Constitutive model for timber fracture under tensile and shear loads	Smidova, E. Kabele, P.	Czech Technical University in Prague	Czech Republic	Theme 1: Theoretical modeling in damage mechanics	July 10	12:10 - 12:30	A001
135	From JL Chaboche damage models to ODM models for CMC and their validation	Laurin, F. Kaminski, M. Bouillon, F. Maire, J.F.	ONERA, the french aerospace lab	France	Plenary Session, MS/Chaboche	July 9	14:55 - 15:30	N101
136	Optimization of reinforcement for RC walls with introduction of a seismic accelerogram	BELAIDI, O. KHEDDACHE, L. OULD OUALI, M. HANNACHI, N.E.	Laboratoire Elaboration et Caractérisation des Matériaux et Modélisation – LEC2M	Algeria	Theme 3: Experimentation and engineering application	July 10	15:30 - 15:50	C002
137	Controlled damages in electrodes: A novel technology of thermal runaway mitigation	Qiao, Y. Wang, M. Le, A.V.	University of California, San Diego	United States	Theme 3: Experimentation and engineering application	July 8	15:30 - 15:50	C001
138	The covariance principle and a 4D formalism for rate formulations of constitutive models	Wang, M. Panicaud, B. Rouhaud, E.	UTT	France	Theme 1: Theoretical modeling in damage mechanics	July 10	16:10 - 16:30	A001
139	Numerical implementation and application of an extended Gurson model for nanoporous materials	Morin, L. Kondo, D. Leblond, J.B.	Institut Jean Le Rond d'Alembert	France	Theme 1: Theoretical modeling in damage mechanics	July 10	11:30 - 11:50	A001
140	A ductile damage model for porous materials with non-associated Drucker-Prager matrix	Cheng, L. Yun, J. Oueslati, A. Saxce, G. D. Kondo, D.	UPMC, Institut Jean Le Rond D'Alembert	France	Theme 1: Theoretical modeling in damage mechanics	July 10	11:10 - 11:30	A001
141	Generic delocalization of a local damage model using the Thick Level Set approach and comparison with other methods	Cazes, F. Moës, N.	GeM	France	Theme 1: Theoretical modeling in damage mechanics	July 9	10:10 - 10:30	A001

143	Mechanical Properties of Innovative Pothole Patching Materials Featuring High-Toughness Low-Viscosity Nano-Molecular Resins	Woody Ju, J.W. Yuan, K.Y. (Matt)	UCLA	United States	Plenary lecture	July 8	10.00 - 10:40	N101
144	Fast Plastic Integration Algorithm for Damage Prediction in Forming Process Simulations	Halouani, A. Li, Y. Abbès, B. Guo, Y.Q.	GRESPI/MPSE, University of Reims	France	Theme 2: Numerical Simulation in damage mechanics	July 9	12:10 - 12:30	A002
145	Stochastic Continuum Damage Mechanics using Spring Lattice Models	Kale, S. Koric, S. Ostoja-Starzewski, M.	University of Illinois at Urbana-Champaign	United States	Theme 2: Numerical Simulation in damage mechanics	July 8	16:30 - 16:50	A002
146	Ductile failure of Nuclear steel accounting for strain ageing	Ren, S. Maziere, M. Forest, S. Morgeneyer, T. Gilles Rousselier	Mines ParisTech	France	Theme 3: Experimentation and engineering application	July 10	15:10 - 15:30	C001
147	Anisotropic ductile fracture behavior of an aluminum alloy	Lou, Y. Chen, L. Clausmeyer, T. Ortelt, T.R. Chen, H. Tekkaya, E.	Institute of Forming Technology and Lightweight Construction, TU Dortmund	Germany	Theme 1: Theoretical modeling in damage mechanics	July 8	17:30 - 17:50	A001
148	Asymptotic self-similar solution of the creep crack problems in damaged materials under mixed mode loading	Stepanova, L. Yakovleva, E. Mironova, E.	Samara State University	Russian Federation	Theme 1: Theoretical modeling in damage mechanics	July 8	15:10 - 15:30	A001
151	Advanced anisotropic damage model fully coupled with anisotropic plasticity	Badreddine, H. Saanouni, K.	UTT	France	Theme 1: Theoretical modeling in damage mechanics	July 8	17:50 - 18:10	A001
152	A Nonlocal Extension of an Anisotropic Continuum Damage Mechanics Model	Soyarslan, C. Gülçimen, B. Bargmann, S.	Institute of Continuum Mechanics and Material Mechanics, Hamburg University of Technology, 21073 Hamburg, Germany	Germany	Theme 1: Theoretical modeling in damage mechanics	July 9	12:10 - 12:30	A001
154	A statistical/computational/experimental approach to study the microstructural morphology of damage	Du, C. Geus, T.D. Hoefnagels, J. Peerlings, R. Geers, M.	TU Eindhoven	Netherlands	Theme 3: Experimentation and engineering application	July 8	15:50 - 16:10	C001
155	ON THE COUPLING OF DUCTILE DAMAGE WITH DISTORTION OF YIELD SURFACE FOR SHEET METAL FORMING	BADREDDINE, H. YUE, Z. SAANOUNI, K.	University of Technology of Troyes	France	Theme 1: Theoretical modeling in damage mechanics	July 10	11:50 - 12:10	A001
159	Failure prediction on the second Sandia Fracture Challenge based on a cohesive zone model	Chiaruttini, V. Mazière, M. Feld-Payet, S. Yastrebov, V. Besson, J. Chaboche, J.L.	Onera	France	Theme 3: Experimentation and engineering application	July 9	12:10 - 12:30	C001

162	Ductile fracture and the validity of uncoupled ductile fracture criteria in micro-scaled plastic deformation	Fu, M.	The Hong Kong Polytechnic University	Hong Kong	Theme 3: Experimentation and engineering application	Juli 8	17:30 - 17:50	C001
163	Microstructural characteristics of geopolymers affecting damage and fracture mechanisms: An overview	Kim, E. Yang, B.J. Lee, H.K.	Korea Advanced Institute of Science and Technology	Korea, Republic Of	Theme 3: Experimentation and engineering application	July 9	11:50 - 12:10	C001
164	New Concepts in Continuum Damage Mechanics	Voyiadjis, G.Z. Kattan, P.	Independent Researcher	Jordan	Plenary Session, MS/Voyiadjis	July 9	17:45 - 18:15	N101
166	Second order anisotropic damage framework: from theory to applications	Desmorat, R.	LMT-Cachan	France	Plenary Session, MS/Chaboche	July 9	15:30 - 16:00	N101
167	Enlarged finite strain modeling incorporating Adiabatic Shear Banding and post-localization microvoiding as shear failure mechanisms	DRAGON, A. LONGERE, P.	Institut Pprime (UPR CNRS 3346), ISAE-ENSMA, BP 40109, F-86961 Futuroscope-Chasseneuil	France	Plenary lecture	July 10	09:00 - 09:40	N101
168	On Materials with Time Dependent Properties: Application to the Continuum Mechanics of Curing	Steinmann, P. Hossain, M. Saxena, P.	University Erlangen-Nuremberg	Germany	Plenary Session, MS/Chaboche	July 9	14:15 - 14:55	N101
169	Innovative Strain Energy Based Thermo-Elastoviscoplastic Damage-Self Healing Model for Bituminous Pavements	Ju, J.W. Hong, S. Yuan, K.Y.	UCLA	United States	Plenary Session, MS/Voyiadjis	July 9	17:15 - 17:45	N101
170	EVALUATION OF MICROMECHANISMS OF DAMAGE AND FRACTURE IN COMPOSITE JOINTS	Dzenis, Y.	Department of Mechanical and Materials Engineering, University of Nebraska-Lincoln	United States	Theme 3: Experimentation and engineering application	July 10	15:50 - 16:10	C001
171	Numerical Simulation and Experimental Investigation of Damage Evolution in Steel S355	Tu, H.Y. Schmauder, S. Weber, U. Morgeneyer, T.F. Cheng, Y.	Institute for Materials Testing, Materials Science and Strength of Materials (IMWF), University of Stuttgart	Germany	Theme 1: Theoretical modeling in damage mechanics	July 10	16:10 - 16:30	A001

A total of 124 presentations with 12 plenary lectures and 8 short presentations not yet confirmed

Instructions for the Chairpersons

When you arrive at the conference site, please check the printed program (Program Booklet) to confirm the schedule of your session and the room assignment.

Chairpersons should be present in the conference room of their session at least 10 mn before the beginning of the session.

Each conference room is managed by a technical staff that helps to solve technical problems occurring during the session and hand out the microphones in the audience during the discussions.

Please check the presence of all the speakers scheduled for your session before the beginning of the session. You are in charge of keeping scrupulously the schedule so that participants can shift from one room to the other. You are also in charge of animating the discussion following each lecture. If necessary you can skip or shorten the discussion.

If a speaker is absent, please do not advance the following talk. You must make the audience wait until the next presentation, as defined in the initial program, by suggesting a discussion of earlier presentations.

Please note that presentation time is depending in the type of the oral presentation according to:

	Lecture time	**Discussion time**	**Total time**
Plenary lectures	35 mn	10 mn	45 mn
Keynote lectures	25 mn	5 mn	30 mn
Full papers presentation	15 mn	5 mn	20 mn

To leave the required time for discussion, please don't hesitate to interrupt the oral presentation of any speaker who exceeds his allowed time.

Instructions for Oral Presentations

General recommendations:

When you arrive at the conference site, please check the printed program (Program Booklet) to confirm the schedule of your presentation and the room assignment. You may refer to **General Program & List of Oral Presentations** on page 15 for a quick check of your presentation (room, time, etc…).

Try to be in your presentation room 10 minutes prior to the starting time. Please indicate your presence to the chairperson of your session. You are expected to be present for the entire time of each session.

Please note that presentation time is depending in the type of your oral presentation according to:

	Lecture time	**Discussion time**	**Total time**
Plenary lectures	35 mn	10 mn	45 mn
Keynote lectures	25 mn	5 mn	30 mn
Full papers presentation	15 mn	5 mn	20 mn

Please respect scrupulously your presentation time. If not, the chairperson is asked to interrupt your presentation to leave enough time for discussion.

Available Audio/Video Equipment:

A PC with Windows 7, PowerPoint 2010 and Adobe Acrobat (pdf), connected to a video projector is standard in each conference room. Please bring your presentation on a Memory Stick connectable through the USB port of the PC and upload it before the beginning of your session.

You may also use your own laptop computer to make your presentation but, in this case, you need to check your presentation beforehand by connecting your laptop to the video projector of your conference room during the coffee or lunch break prior to your session.

If videos are included within your PowerPoint presentation, please check them in your conference room prior to your session.

If your laptop is Apple (Macintosh), please ensure to bring with you a VGA dongle/adapter compatible with your MAC for external video signal and **come to check it** in your conference room prior to your session.

Conference room managers will be present in each conference rooms to help you if you have any technical problem.

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PROGRAM OF ORAL SESSIONS WITH ABSTRACTS

WEDNESDAY, JULY 8, 2015

08:00 - 09:30	**REGISTRATION & WELCOME COFFEE (RECEPTION AREA)**		
09:30 - 10:00	**OPENING SESSION (ROOM N101)**		
10:00 - 10:40	**PLENARY 1, Room: N101** **Chairperson: D. Hayhurst**		
	ID 143; Mechanical Properties of Innovative Pothole Patching Materials Featuring High-Toughness Low-Viscosity Nano-Molecular Resins		
	Ju, J.W.; Yuan, K.Y. (Matt); UCLA, United States		
	Revolutionary pothole patching materials with high toughness, high fatigue resistance that are reinforced with nano-molecular resins are developed to enhance their resistance to traffic loads and service life of repaired potholes. In particular, DCPD resin with a Ruthenium-based catalyst is employed to develop controlled properties that are compatible with aggregates and asphalt binders. A multi-level micromechanics-based numerical framework is developed to predict the mechanical properties and dynamic moduli of these innovative nano-molecular resin reinforced pothole patching materials.		
	Room A001 **Chairpersons: G.Z. Voyiadjis and Y. Liu**	**Room A002** **Chairpersons: Z. Chen and Y. Sonoda**	**Room C001** **Chairpersons: M. Davydova and K.C. Pei**
10:50 - 11:10	ID 8: Complex Damage Variables in Continuum Damage Mechanics	ID 11: Recent Advances in Simulating Failure Evolution with the Material Point Method	ID 65: Using Acoustic Emission Monitoring to Observe the De-bonding Behavior of Rebar in Cyclic Pull-Out Tests
	Voyiadjis, G.Z.; Kattan, P.; Louisiana State University, United States	Chen, Z.; Zhang, X.; Dalian University of Technology / University of Missouri, United States	Pei, K.C.; Kan, Y.C.; Institute of Nuclear Energy Research (INER), Taiwan
	The concept of complex damage variables is introduced in this work. They are introduced not to use them in practical applications but to try to derive a direct relationship between the damage due to cross-sectional area reduction and the damage due to elastic stiffness degradation. In addition this concept can provide an insight in addressing the concept of healing that the authors have extensively published as well as the concept of undamageable materials.	Recent advances in developing a combined elastoplasticity/decohesion model within the framework of the Material Point Method (MPM) are discussed with a focus on the crack problem as described in the Sandia National Laboratories (SNL) challenge. Based on the parametric study and available experimental data, the proposed model-based simulation procedure is verified and improved to predict the essential feature of the cracking response with the least computational expense.	This research aimed to reveal the bond behavior and failure mechanism of varying size re-bar embedded in concrete with inside pre-crack through a series of dynamic pull-out tests and the acoustic emissions monitoring (AE). The AE records, for analyzing the de-bonding behavior of concrete specimens, provide useful information in evaluating the safety of RC structure subjected to cyclic load, as well as quantitative observation to study the remaining life of RC after damage by earthquake or shake.
11:10 - 11:30	ID 13; A creep damage model for rock mass based on internal variable theory	ID 100; Multiresolution Fatigue Damage Analysis	ID 113; Statistical laws of dynamic fragmentation of ZrO2 ceramics.
	Liu, Y.; Zhang, L.; Yang, Q; Tsinghua University; China	Chow, C.L.; Shen, J.; Chen, H.; University of Michigan--Dearborn, United States	Davydova, M.; Uvarov, S.; Chudinov, V; Institute of Continuous Media Mechanics UB RAS, Russian Federation
	The creep damage is discussed within Rice irreversible internal state variable (ISV) thermodynamic theory. A viscoelastic-viscoplastic model with damage is derived by giving the complementary energy density function and kinetic equations of ISVs. The viscoelastic equation covers classical component model and three creep phases with hardening and damage effect can be described by this model. Then intrinsic thermodynamic properties in three creep stages are indicated. The thermodynamic state tends to equilibrate without damage and depart from equilibrate with damage.	Fatigue damage is a form of material degradation under repeated mechanical and/or thermal loading. A novel multiresolution fatigue damage analysis is formulated and used to estimate low cycle fatigue damage. The progressive fatigue damage is measured based on the x-ray computed tomography common known as CT scan in the form of nano/micro-scaled voxels. Through kd-trees in the form of multiresolution pyramid, the measured microdefects/voids are transformed to that of mesoscale to finally macroscale damage variables. The entire transformation process is achieved analytically by means of 3D finite element analysis and specially formulated super representative volume elements (SRVE). The estimated macro-scale damage variables in terms of effective Young's moduli are compared with those measured experimentally and found to be in satisfactory agreement.	Dynamic fragmentation of ceramic samples with different porosity were carried out using modified Hopkinson bar setup, which allow us to keep samples safe (in order to define fragment size distribution) and to measure fractoluminescence impulses occurred on the fracture surfaces (in order to establish the distribution of intervals between impulses). The analysis of experimental data reveals that the fragment size distribution and distribution of interval between fractoluminescence impulses obeys a power law, which exponent depends on ceramics porosity.

11:30 - 11:50	ID 32; Radiation induced damage in ductile materials subjected to time-dependent stresses	ID 35; FAILURE SURFACE VARIATION OBTAINED WITH THE TRUSS-LIKE DISCRETE ELEMENT METHOD	ID 117; In-situ dynamic experiments and modeling in multiscale kinetics of damage-failure transition
	Skoczen, B.; Ustrzycka, A.; Cracow University of Technology, Institute of Applied Mechanics, Poland	"Silva, G.S.D.; Fernandes, F.G.; Colpo, A.B.; Puglia, V.B.; Kosteski, L.E.; Brazil	Naimark, O.; Institute of Continuous Media Mechanics of Russian Academy of Sciences; Russian Federation
	Physically based multi-scale constitutive model comprising evolution of radiation induced damage in ductile materials subjected to periodic stress states in the inelastic range is formulated. The evolution of radiation induced damage is combined with the evolution of classical micro-damage of mechanical origin within the common framework of CDM. Kinetics of radiation induced damage involves the Rice & Tracey and the extended type Gurson laws. Closed form analytical solutions for the problem of periodic irradiation combined with cyclic loads were obtained.	This paper presents the study of failure surface obtained in the truss-like Discrete Element Method (DEM). The element's constitutive law considers the fracture energy of the material and its spatial variation is used to take into account the heterogeneity of the simulated materials. It is studied the influence of the constitutive law parameters, the spatial distribution of fracture energy and the spatial lattice perturbation on the DEM failure surface. A DEM failure criterion is compared with concrete and rock failure	Novel tendencies in study of damage-failure transition are related to in-situ experimental techniques and methodologies to obtain multiscale sampling of nonlinear damage-failure kinetics. Application of in-situ methods in the study of damage-failure scenario as specific type of criticality in mesodefect ensembles (structural-scaling transition) allowed the validation of computational approaches in order to bridge the characteristic length and time scales and to identify the set of material characteristics and material properties/responses that govern failure phenomenon in wide range of load intensity.
11:50 - 12:10	ID 61; Multi-phase modelling of concrete affected by sulfate attack	ID 57; Impact Failure analysis of RC beam using SPH method based on damage theory	ID 124; Evaluation of cumulative damage of RC members under repeated impact loading
	Cefis, N.; Comi, C.; Politecnico di Milano, Italy	Sonoda, Y.; Kyushu University, Japan	Tamai, H.; Sonoda, Y.; Kyushu University Japan
	This study focuses on the modeling of damage in concrete subject to sulfate attack. A reactive-diffusion model allows for the computation of the expansive products of the reaction occurring between the aluminates of the cement paste and the incoming sulfate ions. The concrete is then modeled as a multiphase material made of a solid skeleton, a fluid phase including water and air and an expanding phase, which exerts a pressure capable of damaging the concrete surrounding the reactive sites.	This research presents an impact analysis method of a RC(reinforced concrete) beam based on damage theory. In this analysis, RC beam is discretized by SPH particles and the Drucker Prager criterion with post-peak softening is employed. In addition, stiffness decrease due to tensile cracks are calculated by damage factor and it considered in the constitutive law. According to the results, it is confirmed that this method can predict precise crack path and accurate displacement response under arbitrary impact loading condition.	In order to quantitatively evaluate the dynamic behavior and cumulative damage of reinforced concrete members under low-velocity single and repeated impact loading, we conducted numerical approach by using the theory of Continuum Damage Mechanics. At the result, we clarified not only impact behavior of the members but also the relationship between cumulative kinetic energy of repeated impact loading and cumulative damage of the members. In addition, applicability limit of our model based on scalar damage modeling was clarified.
12:10 - 12:30	ID 107; Cohesive Zone Damage-Healing Model for Self-Healing Materials	ID 37; Micromechanical damage simulation to obtain effect of coarse grains distribution on mechanical properties of bimodal AL using 2D XFEM	ID 130; Influence of specimen geometry on strain localization phenomena in steel sheets
	Abu Al-Rub, R.K.; Alsheghri, A.; Masdar Institute of Science and Technology, United Arab Emirates	Hosseini-Toudeshky, H.; Jamalian, M.; Amirkabir University of Technology, Iran	Bao, C.; Francois, M.; Le Joncour, L; Universite de Technologie de Troyes, France
	A thermodynamic framework for formulating cohesive zone damage-healing models (CZDHM) for self-healing materials is presented. The well-known nominal, healing, and effective configurations of classical continuum damage mechanics are extended to self-healing materials. A new physically-based internal crack healing state variables is proposed for describing the healing evolution within the crack cohesive zone. The effects of temperature, crack-closure, and resting time on the healing behavior are discussed. Numerical examples are conducted to show the various novel features of the formulated CZDHM.	Bimodal bulk Al5083 series comprised of Ultra Fine-Grains separated by Coarse-Grains are analyzed here.We first investigated the dependency of stress-strain behavior of models on CG distribution in constant volume fraction by selection of various RVEs. Then XFEM is used for bimodal materials and distinguished between brittle and ductile phases using values of fracture criteria and fracture toughness and cohesive law. The sensitivity of the model to RVEs, prediction of crack initiation-propagation pattern and stress-strain behavior are compared with experimental results.	Strain localization in two kinds of steels undergoing uniaxial tension is investigated by electronic speckle interferometry. The necking in the sheet specimens occurs by forming two narrow crossing bands. A model of strain rate distribution is used to extract quantitative information about the localization bands, such as bandwidths, bands orientations and their maximum strain rates. Thus, their evolutions are followed from the diffuse necking up to the rupture. The influence of specimen geometry on the localization phenomena is studied.
12:30 - 13:45	**LUNCH**		

14:00 - 14:40	PLENARY 2, Room N101 Chairperson: A. Benallal		
	ID 54; ELASTOPLASTIC AND DAMAGE ANALYSIS OF TRUSSES SUBJECTED TO CYCLIC LOADING		
	Šumarac, D.; Perović, Z.; Faculty of Civil Engineering, Serbia		
	In the present paper, Preisach model of hysteresis is extended to structural analysis of damaged trusses under cyclic loading. Parameters for Preisach model of cyclic plasticity are obtained from uniaxial loading experiment. Damage, as a consequence of micro cracks appearance due to alternating loading in plastic domain, is modeled using brittle elements according to Preisach procedure. Results of this research are compared with already existing in the literature. In the paper examples of trusses under various cyclic loadings are presented.		
	Room A001 **Chairpersons: C. Basaran and M. Brunig**	**Room A002** **Chairpersons: C. Stolz and L. Kosteski**	**Room C001** **Chairpersons: Y. Qiao and M. François**
14:50 - 15:10	ID 16; Using Entropy Production Rate as a Metric for a Universal Damage Model	ID 111; From damage to fracture a modelisation based on moving discontinuities and layers	ID 71; Fatigue analysis in adhesive joints
	Basaran, C.; State University of New York at Buffalo, United States	Stolz, C.; CNRS UMR 6183, UMR 8193, France	Martinez, J.F.T.; Rodriguez , J.P.C.; Prieto, P.A.; Universidad de los Andes, Colombia
	A thermodynamics based damage evolution model is presented. The model is purely physical, rather than empirical. Entropy production rate is used as a damage metric instead of a phenomenological damage potential. It is shown that when entropy production rate is used as a damage metric, damage due to numerous related and unrelated external and internal sources can be combined into a single universal damage term, which is not possible with any other phenomenological damage evolution model published in the literature.	A damage approach based on moving layers and discontinuties. is proposed, the moving interface separates the undamaged zone to the damaged one. The layer thickness is limited to a maximum value. The evolution of damage is described and related to this moving layer. This point of view permits the description of initiation and propagation of defects in an unified framework. Variational formulation for the rate boundary problem is obtained and analycal solutions on simple geometries and numerical simulation are presented.	The aim of this work is to investigate the behavior of adhesively bonded GFRP single lap joints subjected to two fatigue regimens: Cyclic low-velocity impacts (impact fatigue) and non-impacting, constant amplitude sinusoidal fatigue (standard fatigue). For each regimen three different bondline thicknesses are used, in order to analyze the influence of this variable in the behavior of the studied joints. Additionally, several parameters such as normalized maximum force, absorbed energy and stiffness deterioration are used to characterize damage evolution.
15:10 - 15:30	ID 148; "Asymptotic self-similar solution of the creep crack problems in damaged materials under mixed mode loading"	ID 63; Adaptive zooming method for the simulation of quasi-brittle materials	ID 105; Failure mechanisms in high strength steel under impact loading: from ASB to full fracture
	Stepanova, L.; Yakovleva, E.; Mironova, E.; Samara State University, Russian Federation	Llau, A.; Jason, L.; Baroth, J.; Dufour, F.; CEA, DEN/DANS/DM2S/SEMT/LM2S, 91191 Gif sur Yvette, France	Roux, E.; Longère, P.; Cherrier, O.; Millot, T.; Capdeville, D.; Petit, J.; " Université de Toulouse, Institut Supérieur de l'Aéronautique et de l'Espace (ISAE), Institut Clément Ader (ICA EA 814), Toulouse, France
	A self-similar solution of the creep crack problem in damaged materials under mixed mode loading is obtained. Analysis of the near crack tip stress and damage fields is reduced to the nonlinear eigenvalue problem. The new procedure for calculating the full spectrum of eigenvalues for the nonlinear eigenvalue problem in the whole range of mixed modes is proposed. The new eigenvalues define the asymptotic behavior of the far stress field in the problem of a crack in a damaged medium.	A method to simulate concrete structures (quasi brittle material) with localized nonlinearities is presented. Based on Guyan condensation, it consists in replacing the elastic zones of the structure by their equivalent rigidities (super-elements). The nonlinear computation is then performed only on the damaged zones of interest. As new damaged zones may appear, our method monitors the evolution of the system and re-integrates condensated areas if necessary. This method, applied on different tests cases, allows substantial computation economy.	Impact tests on pre-notched plates are carried out to analyze qualitatively and quantitatively the crack development in high strength steel under high loading rate. Implementation of ultra-high speed camera (1M frame/s) allows on one hand observing the chronology of the failure mechanisms from adiabatic-shear-banding until full fracture. On the other hand, digital images analysis was performed to quantify the kinetics of the successive deterioration processes at stake and to express the corresponding kinematic and further strain and strain-rate fields.

15:30 - 15:50	ID 53; On the use of the generalized eigenstrain method in the modeling of coupling between damage and corrosion	ID 81; Methods for Damage Analysis of Steel Structures	ID 137; Controlled damages in electrodes: A novel technology of thermal runaway mitigation
	Panicaud, B.; UTT, France	Heinrich, S.; Kowalsky, U.; Dinkler, D.; Institute for Structural Analysis, Germany	Qiao, Y.; Wang, M.; Le, A.V.; University of California, San Diego, United States
	The coupling between mechanical behaviour and chemistry is investigated. The Generalized Eigenstrain Method is used that enables to take into account several coupling, such as damage and corrosion. Modelling is then performed and compared for different configurations. Chemical reactions and diffusion effects are thus described in order to improve accuracy of such micromechanical time-dependent model. Application is made on a steel reinforced concrete material. Moreover, a particular and original coupling has been introduced, which is justified using thermodynamics arguments.	For cyclic loading of steel structures a viscoplastic material model with hardening is presented. Damage evolution accounts for the decreasing material resistance. To recover mesh independency during strain-softening an implicit gradient formulation is taken into account. The element size is limited by the internal length and makes simulations of structures very complex. An approach to reduce the computational cost is to create a beam element with further ansatz functions to account for the plastic hinges including damage occuring in structures.	A major concern of applying large-scale lithium ion batteries is thermal runaway: Upon mechanical or thermal abuse, e.g. an external impact, key components such as membrane separators may be broken and internal shorting would happen, which can lead to a rapid increase in local temperature. A novel approach to mitigate thermal runaway is to control the damaging mode of electrodes, so that the internal impedance is significantly increased when internal shorting is detected. Our recent experimental work demonstrated promising results.
15:50 -16:10	ID 122; THERMODYNAMIC MODELING OF DAMAGE IN TWO-PHASE MATERIALS	ID 74; Nonlocal Continuum Damage Mechanics approach of a discrete axial chain under non-uniform axial load	ID 154; A statistical/computational/experimental approach to study the microstructural morphology of damage
	Egner, H.; Ryś, M.; Institute of Applied Mechanics, Cracow University of Technology, Poland	Herisson, B.; Picandet, V.; Challamel, N.; Perrot, A.; Université de Bretagne Sud, France	Du, C.; Geus, T.D.; Hoefnagels, J.; Peerlings, R.; Geers, M.; TU Eindhoven Netherlands
	In this work, an elastic-plastic-damage two-phase material model is introduced. The formalism of thermodynamics of irreversible processes with internal state variables, and the local state method are adopted under the assumption of small strains. The proposed model contains the following features: total energy hypothesis is applied; damage evolution in both phases is regarded; various coupling terms are present in kinetic equations of force-like variables. The successful application of the model to describe the behavior of austenitic stainless steel is performed.	The tensile failure of an axial damage chain, constituted of a series of periodic elastic-damage springs, is considered. This discrete damage mechanic system model is continualized using an asymptotic expansion of the finite difference equations and using a phenomenological nonlocal approach leading to formulation of a gradient-type damage model. The length scale depends on the cell size in the first case while it depends also on loading parameter in the second case. This fundamental property finds here a theoretical justification.	A systematic study of micro-failure is conducted to deepen the insight on the failure mechanisms in multi-phase materials, by statistically averaging over damage initiation sites in (i) over 400 randomly-generated idealized microstructural models loaded in pure shear and (ii) many large field-of-view SEM images of dual-phase steel deformed in uniaxial tension. Both techniques were carefully validated for accuracy and showed a similar microstructural configuration to be critical for damage initiation: soft matrix material with hard inclusion particles on opposing sides.
16:10 - 16:30	**COFFEE BREAK**		
	Room A001 **Chairpersons: A. Nayebi and J. Cesar de Sa**	**Room A002** **Chairpersons: M. Ostoja-Starzewski and C. Labergère**	**Room C001** **Chairpersons: M. Fu and J. Chen**
16:30 - 16:50	ID 55; ON ELASTICITY TENSOR OF ANISOTROPIC DAMAGE MECHANICS	ID 145; Stochastic Continuum Damage Mechanics using Spring Lattice Models	ID 41; Effect of crack closure parameter and negative triaxiality on damage growth in upsetting problem
	Jarić, J.; Kuzmanović, D.; Šumarac, D.; Faculty of Matematics, University of Belgrade, Serbia	Kale, S.; Koric, S.; Ostoja-Starzewski, M.; University of Illinois at Urbana-Champaign, United States	Kumar, M.; Dixit, P.M.; Indian Institute of Technology Kanpur India
	The anisotropic damage mechanics is presented starting from the principle of strain equivalence. In this paper, making use of (1), we derived elasticity tensor as a function of damage tensor in closed form. The procedure is applied for several symmetries important for applications. As an example numerical calculation for transversely isotropic material is presented. (1) Jaric, J.P., Kuzmanovic, D.S. and Sumarac, D.M.: On Anisotropic Elasticity Damage Mechanics, I. J. Damage Mechanics, 22(7), 1023-1030, (2013). Contact number:	The spring lattice models offer a powerful way of modeling damage evolution in disordered materials by explicitly representing the disorder, microcrack nucleation and coalescence processes. The evolution of anisotropic damage tensor is studied using spring lattice models in 2D and 3D, where presence of disorder leads to the size effects in strength and damage. The study provides further insight into size scaling and stochastic evolution in damage phenomena leading to the foundation of stochastic continuum damage mechanics.	A Continuum Damage Mechanics model, that incorporates a crack closure parameter and a cut-off on negative triaxiality, is employed to simulate the damage growth in upsetting problem using the finite element package ABAQUS. Parametric studies are carried out to find the effect of the crack closure parameter and the cut-off. It is shown that the correct location of the maximum damage in upsetting (i.e., the location reported in the experimental literature) is predicted only if these parameters are incorporated.

16:50 - 17:10	ID 103; Brittle damage in initially anisotropic materials: a model accounting for the induced anisotropy and unilateral effects	ID 72; Numerical simulation based on mixed MESHLESS/MEF formulation. Application to solid mechanics with ductile damage.	ID 83; Modelling of chip breakage in machining process with damage mechanics model
	Welemane, H.; Goidescu, C.; Kondo, D.; Pantalé, O.; Karama, M.; Université de Toulouse; INP/ENIT, France	LABERGERE, C.; GHOZZI, Y; VILLON, P; SAANOUNI, K; UTT, ICD/LASMIS UMR CNRS 6281, France	Wu, B.; Yan, Y.; Münstermann, S.; RWTH Aachen University, Germany
	A new micromechanical modelling approach for brittle damage in initially orthotropic materials is presented. The proposed strain-based energy formulation allows to derive a fully anisotropic multilinear model for microcracked materials with arbitrary oriented defects. The thermodynamics framework provides a standard procedure for the damage evolution law. The new model explicitly accounts for the interaction between primary and induced anisotropies. Moreover, the very challenging issue of opening-closure effects (unilateral behavior) is addressed in this framework.	In this paper, a so-called “mixed” numerical method combining both Meshless to discretize areas of high deformation gradient where damage occurs, and Finite Element Method (MEF) for elastic areas is developed. The reliability and performance of the “mixed” model is checked by a comparative study with a standard FEM model. A comparative study through usual nonlinear simple tests with damage (tensile test, shear test) is performed.	Desired chip breakage is important for machining process. In order to investigate the chip breakage behaviour in turning process, damage mechanics approach was applied in FE simulation of chip breakage. In this work, an advanced damage mechanics model was implemented for description of the plastic flow and damage behaviour of chip material in simulation. This material model takes the temperature, strain rate as well as state of stress into consideration, which are essential for application in machining processes.
17:10 - 17:30	ID 10; "Using of anisotropic continuum damage mechanics to describe yield surface distortion	ID 56; Heterogeneous Lattice Model Based Simulation of Concrete under Uniaxial Loading	ID 106; Strain-based continuum damage mechanics model for predicting FLC of AA5754 under warm forming conditions
	Nayebi, A.; Hojjatollah, R.; Shiraz University, Iran	Yan, X.; Li, J.; Ren, X, China	Mohamed, M.; Shi, Z.; Lin, J.; Dean, T.; Dear, J; Imperial College London, United Kingdom
	In this paper, yield surface distortion is studied by considering the combination of nonlinear kinematic hardening model of Chaboche and a new anisotropic continuum damage evolution model. In order to describe damage state, the fictitious continuum domain was considered and the consistent relations between real and fictitious domains were developed. It is shown that the combination of the Chaboche’s model and model of anisotropic continuum damage leads to well description of subsequent yield surface.	The inhomogeneous lattice model is presented to simulate the behaviors of concrete, in which the concrete is regarded as single random medium material and the stochastic damage constitutive model is proposed. The mesh sensitivity is analyzed and the scale of the representative volume element is proposed based on the research of the damage mechanism in meso-level of concrete. The parameters of the stochastic damage constitutive is identified compared with the experiment results of concrete under uniaxial tension and uniaxial compression.	This paper represents a novel strain based continuum damage mechanics (CDM) model for predicting FLCs for AA5754 under warm forming conditions. The model is formulated and calibrated based on two different sets of experimental data; isothermal uniaxial tensile data at temperature range of 20-300˚C and strain rates of 0.001-10s-1 and isothermal FLC data at temperatures range of 20-300˚C and forming speeds ranging from 20-300 mm s-1. A good agreement has been achieved between the experimental and numerical data.
17:30 - 17:50	ID 147; Anisotropic ductile fracture behavior of an aluminum alloy	ID 21; A micro-cell size dependent damage law of concrete	ID 162; Ductile fracture and the validity of uncoupled ductile fracture criteria in micro-scaled plastic deformation
	Lou, Y.; Chen, L.; Clausmeyer, T.; Ortelt, T.R.; Chen, H.; Tekkaya, E.; Institute of Forming Technology and Lightweight Construction, TU Dortmund, Germany	Liang, S.; Ren, X.; Li, J.;Tongji University China	Fu, M.; The Hong Kong Polytechnic University, Hong Kong
	Anisotropic ductile fracture behavior attracts increasing attentions recently for experimental study and analytical modeling. This paper applied a linear transformation based anisotropic ductile fracture criterion to model direction-dependent ductile fracture of an aluminum alloy of AA6082. It is proved that the criterion provides good predictability of anisotropic fracture strain from the comparison between experimental results and predicted fracture strain.	A micro-cell size dependent damage evolution law is proposed by the multi-scale damage model. The homogenization based multi-scale damage representation is firstly introduced in obtaining the macro-damage evolution from micro-cell analysis. Then, the micro-cells with different sizes are generated and the corresponding simulations are given. Based on the simulation results, we define the micro-cell size dependent exponential damage evolution law. Finally, the accuracy and efficiency of the proposed damage evolution law are verified by the notched beam simulation results.	Micro-scaled plastic deformation has been widely used to fabricate microparts with at least two dimensions in sub-millimeter. The ductile fracture at micro-scale and the validity of ductile fracture criteria could be different compared with those at macro-scale. The research explores ductile fracture and the applicability of ductile fracture criteria using micro upsetting and heading processes and modeling of the deformation behavior by hybrid constitutive model. The research presents an in-depth understanding of ductile fracture at micros-scaled deformation processes.

17:50 - 18:10	ID 151; Advanced anisotropic damage model fully coupled with anisotropic plasticity	ID 33; Chemistry of crack initiation in amorphous silicon	ID 129; Effect of freeze-thaw cycles on mechanical behaviors of ceramist concrete under impact loading
	Badreddine, H.; Saanouni, K.; UTT France	Tabatabaei, M.; Shodja, H.; Sharif University of Technology, Iran	Chen, J.; Qiu, X.; Shi, G.; Chen, B.; Huang, X.; Faculty of Mechanical Engineering and Mechanics, Ningbo University China
	This paper deals with the formulation of an advanced mechanical model describing a wide class of anisotropic elastoplastic constitutive equations accounting for the strong coupling with the anisotropic ductile damage. The plastic anisotropy is accounted for through a non-associative theory. The damage anisotropy is defined by using a second rank tensor. Finally, in order to illustrate the predictive capabilities of the model, a parametric studies is done with some simple and complex loading case are investigated.	We use Ab initio density functional theory (DFT) to study the chemistry of crack initiation in an amorphous silicon (a-Si) containing three-fold-coordinated atom (dangling bond) or a five-fold-coordinated atom (floating bond). We apply ab initio MD program VASP for simulating a-Si samples and strain loading. A slight increase of uniaxial strain at the strain level corresponding to the ultimate strength leads to a necking in one of the bonds of the sp3 hybridized orbital pertinent to the trigonal prism.	Concrete samples with four kinds of ceramsite volume fraction including 0%, 15%, 30% and 45% and subjected to 0, 10, 20, 30 and 40 cycles of freezing and thawing respectively, are tested by means of the Spilt Hopkinson Pressure Bar technique. The experimental results showed that the dynamic behaviors of ceramisite concrete are weakened with increasing of the number of freeze-thaw cycles. Change law of dynamic compressive strength and damage evolution affected by freeze-thaw cycling are discussed in the paper.
18:15-18:45	**MEETING OF THE ICDM DIRECTORS**		
20:00-22:00	**CHAMPAGNE TASTING & WELCOME BUFFET**		

THURSDAY, JULY 9, 2015

09:00 - 09:40	**PLENARY 3 (Room: N101)** **Chairperson: J.W. Ju**		
	ID 123; A GTN model for high and low triaxiality stress states		
	Malcher, L.; Pires, F.; **Cesar de Sa, J.**; INEGI – Institute of Mechanical Engineering and Industrial Management, Faculty of Engineering, University of Porto, Portugal		
	An improvement of the GTN model that includes a nucleation law for second-phase particles, an alteration of the yield surface to incorporate two different damage mechanisms (volumetric void growth and shear damage), a modified Lode angle dependence and a criterion for coalescence of voids, was developed. The improvement is verified with the increase accuracy to model prediction of ductile failure under mixed loading conditions, providing a more precise fracture location and more accurate values at the time of crack formation.		
	Room A001 **Chairperson: J. Li**	**Room A002** **Chairperson: A. Korsunsky**	**Room C001** **Chairperson: B. Panicaud**
09:50 - 10:10	ID 51; Stability Analysis of Wave Propagation in Softening Solids	ID 40; Mathematical and numerical modelling of large axisymmetric creep strains and damage	ID 30; Influence of residual stresses on the damage of composite laminates under tensile loading
	Ren, X.; Li, J.; Tongji University China	Szuwalski, K.; Ustrzycka, A.; Cracow University of Technology, Institute of Applied Mechanics, Poland	Wen, Z.; Gong, X.L.; Université de Technologie de Troyes, France
	The softening solids, which is often described by damage models, may experience localization and dispersion during wave propagation. In the present work, the strain localization induced by wave propagation is investigated in the view of mathematics. The governing equations of the wave propagation are developed with the material nonlinearity and softening described by damage model. Then the mathematical stability analysis is performed and the threshold of stability is derived. Finally, the results are verified by the finite element simulations.	The theoretical model for large creep deformation of the axisymetric elements with the account of ductility and embrittlement of the material under radial pressure in presence of body force is established. The finite strain theory is applied. We assume that microcracking and diminishing of transversal dimensions start from the very beginning of creep process. Additional time factor leads to subsequent complications. To make the model complete, the numerical procedure is proposed. The example shows effectiveness of this procedure.	This work investigates the influence of residual stresses on the damage of composite laminate under tensile loading. The incremental hole-drilling method is applied to determine residual stresses and acoustic emission is used for the identification of damage modes. The samples with different residual stress distribution are prepared through curing and post curing to study the role of residual stress in damage process. The acoustic signal features such as amplitude and frequency are used to characterize the damage of composite laminate.
10:10 - 10:30	ID 141; Generic delocalization of a local damage model using the Thick Level Set approach and comparison with other methods	ID 58; Coupled damage-plasticity modelling of ductile failure in an aluminium alloy	ID 90; FE analysis of flexural behavior of externally bonded CFRP reinforced timber beams
	Cazes, F.; Moës, N.; GeM, France	Nguyen, G.D.; Korsunsky, A.M.; Belnoue, J.; MBLEM, Department of Engineering Science, University of Oxford, United Kingdom	KHELIFA, M.; THI, V.D.; University of Lorraine, France
	Thick Level Set (TLS) is presented as a generic method to delocalize an existing local damage model. Delocalization using TLS is shown to preserve the formulae that are used to compute energies as compared to the local reference damage model. Comparison is provided with other existing methods like phase-field damage and cohesive zone model (CZM). Numerical results are presented for selected benchmark tests. Influence of boundary conditions on numerical results are particularly emphasized.	Crystal slip during ductile flow of metallic alloys causes hardening. This competes with stress decrease due to cross-section reduction by damage. Constitutive description of damage-plasticity in the present study uses a thermodynamically consistent framework with nonlocal regularisation for numerical stability. Essential and non-essential work of fracture measurements are used to calibrate model parameters and to validate predictions of constitutive response. Implementation decouples local constitutive behaviour from nonlocal interactions, to allow the use of arbitrary finite element codes. Numerical examples illustrate.	A FE analysis is proposed in order to complete the experimental analysis of the flexural behavior of the beams. An elasto-plastic behavior is assumed for reinforced Timber and interface elements are used to model the interaction between CFRP and timber. The predicted and measured load–midspan deflection response results in addition to the failure modes are compared. The predicted FE results are in good agreement with the experimental measured test data.

10:30 - 10:50	ID 60; Elastostatic fields of an embedded circular rigid nano/micro-fiber with interfacial damage in anti-plane couple stress elasticity	ID 59; Recent Developments in Modeling of Progressive Damage in Fiber-Reinforced Composites	ID 94; Validation of micro-meso electrical relations for laminates with varying anisotropy
	Hashemian, B.; Shodja, H.M.; Goodarzi, A.; Sharif University of Technology, Iran	Chen, B.Y.; Tay, T.E.; National University of Singapore, Singapore	Selvakumaran, L.; Lubineau, G.; COHMAS / PSE DIVISION / KAUST, Saudi Arabia
	It is well-known that classical continuum theory has certain deficiencies in predicting the nanoscopic behavior of materials in the vicinity of defects. Couple stress theory is one of the higher order continuum theories which can overcome such difficulties by introducing new characteristic length. An accurate analytical determination of the elastic fields of an embedded circular nano/micro-rigid fiber with damaged interface under remote anti-plane loading in the context of couple stress elasticity is of particular interest.	This presentation provides an overview of recent developments in the modeling of progressive damage in fiber-reinforced composite laminates. Some insights into modeling the size effects of notched composite laminates under in-plane tension and compression, the significance of delamination and the development of tools such as smeared crack models, cohesive elements, XFEM are discussed. Recent interest in the interaction and migration of matrix cracks and delamination, resulting in development of integrated XFEM-CE, phantom-node and floating-node methods will also be briefly presented.	Electrical Resistance Tomography is a promising health monitoring technique. Yet, the link between the degradation mechanisms within the laminate and its global change in resistivity is still missing. We propose an electrical mesomodel that can establish this link. The mesoscale homogenization of transverse cracks is first described for in-plane electrical loading for both the outer and the inner plies. The model is then extended to include the out-of-plane loading as well as local delaminations.
10:50 - 11:10	**COFFEE BREAK**		
	Room A001 **Chairpersons: S. Forest and P. Steinmann**	**Room A002** **Chairpersons: T.A. Tay and S. Wulfinghoff**	**Room C001** **Chairpersons: L. Gelebart and T. Boukharouba**
11:10 - 11:30	ID 131; The micromorphic approach to gradient plasticity and damage with appliation to crack propagation in single crystals	ID 28; Different Numerical Time Integration Schemes for Elastoplasticity Coupled to Anisotropic Damage	ID 25; On the role of in-plane damage mechanisms on the macroscopic behavior of SiC/SiC composites from complementary 2D and 3D in-situ investigations
	Forest, S.; Mines ParisTech CNRS, France	Fassin, M.; Wulfinghoff, S.; Reese, S.; Institute of Applied Mechanics Germany	CHEN, Y.; BERNACHY-BARBE, F.; GELEBART, L.; BORNERT, M.; CHÂTEAU, C.; KING, A.; SAUDER, C.; CEA, France
	The micromorphic approach is applied to damage initiation and localisation in single crystals. Cleavage-like damage is triggered by accumulated plastic slip on slip systems. The model allows crack propagation, bifurcation or branching under complex loading conditions like fatigue, shear and creep. Micromorphic degrees of freedom are associated with the cumulative damage strain, and regularization partial differential equation is derived from the thermodynamical setting. Illustrations deals with fatigue in Nickel-based single crystal superalloys.	During operation of a regeneratively cooled rocket thrust chamber, the cooling channel wall is subjected to extreme thermomechanical loads. These loads cause continuously damage and finally lead to the failure of the wall, well-known as the doghouse effect. A viscoplastic material model coupled with anisotropic damage is implemented in a finite element formulation. The theoretical basis for the damage modeling is adopted from Desmorat and Cantournet (2008). In the end results are compared with them for isotropic damage modeling.	The mechanical behavior of architectured SiC/SiC composites is driven by different damage mechanisms whose understanding is required for building micromechanics-based models able to reproduce and predict its complexity. The kinematics of the surface, precisely analyzed using DIC at the textile pattern scale, exhibit a fiber realignment unexplained by the cracks observed at the surface. The missing mechanism, tracked by tomography in-situ testing (SOLEIL synchrotron), appears to be in-plane microcracking which does not emerge at the free surface of the composite.
11:30 - 11:50	ID 110; Micromechanics-based non-local damage model with gradient of strain	ID 64; Comparison of Two Time-Integration Algorithms for an Anisotropic Damage Model Coupled With Plasticity	ID 27; A macroscopic modeling of SiC/SiC composites derived from experimental micromechanics
	Oliver-Leblond, C.; Dumontet, H.; Kondo, D.; Université Pierre et Marie Curie ,France	Wulfinghoff, S.; Fassin, M.; Reese, S.; RWTH Aachen Germany	BERNACHY-BARBE, F.; GELEBART, L.; BORNERT, M.; CREPIN, J.; SAUDER, C.; CEA, France
	A theoretical formulation of isotropic non-local damage model with gradient of strain is proposed. The approach is based on micro-mechanics based non-local constitutive equation reformulated by means of energetic methods, for the purpose of damage modelling. The equilibrium equations as well as the boundary conditions are derived from the variational principle. Then, the model is applied to a matrix weakened by voids and the choice of the damage variable is discussed.	The talk investigates the modeling of anisotropic damage based on second order damage tensors. Different approaches like the strain or the energy equivalence principle are compared concerning their similarities and differences. Advantages and open issues of the individual formulations are discussed from a thermodynamical perspective. Possible approaches to couple damage with plasticity models, to regularize mesh-dependency as well as the crack-closure effect are also addressed. The findings are illustrated by means of simple one-dimensional and more complex two-dimensional simulation results.	An important experimental work has been carried out to characterize both the damage mechanisms and the macroscopic behavior of SiC/SiC composite tubes under biaxial loadings (tension/torsion and tension/internal pressure). First, damage mechanisms, precisely characterized, are used as sound micromechanical basis to derive a macroscopic model. Among them, emphasis is put on the introduction of a fiber realignment mechanism. The experimental database is then used to identify and validate the model.

11:50 - 12:10	ID 108; Microstructural Modeling of Dual Phase Steel using a Higher-Order Gradient Plasticity-Damage Model	ID 67; Prediction of low cycle fatigue life using cycles jumping integration scheme	ID 163; Microstructural characteristics of geopolymers affecting damage and fracture mechanisms: An overview
	Abu Al-Rub, R.K.; Abid, N.H.; Ettehad, M.; Palazotto, A.N.; Masdar Institute of Science and Technology United Arab Emirates	Labergere, C.; Saanouni, K.; Sun, Z.; Dhifallah M.A.; Li, Y.; Duval, J.L.; UTT, ICD/LASMIS UMR CNRS 6281, France	Kim, E.; Yang, B.J.; Lee, H.K.; Korea Advanced Institute of Science and Technology; Republic of Korea
	This work focuses on the application of a higher-order gradient-dependent plasticity-damage model for microstructural modeling of dual-phase (DP) steels. Damage evolution is governed by the evolution of a nonlocal plasticity measure which is a function of the local equivalent plastic strain rate and its corresponding first-order gradient. Different RVEs of DP microstructures are virtually generated and simulated in order to predict the macroscopic mechanical response. Size effects and additional hardening due to evolution of geometrically necessary dislocations are predicted.	In this paper, the continuum damage mechanics is used to modelize the low cycle fatigue. A numerical methodology based on jump cycle is proposed to predict the life of a part. The jump cycle avoids the calculation of the full cycles without neglecting the transitional periods due to hardening and damage. The residual mechanical fields generated by the plastic deformation of the part during a metalforming process operation are introduced in order to study their impact on the fatigue life.	Mechanical fracture of chemically bonded cements such as geopolymers are linked to failure of interbonds in microstructural matrix. This paper aims to understand microstructural characteristics of geopolymers and to identify fracture mechanisms. In literatures, the differences in the physical properties of geopolymers are observed depending on different molar ratios despite similarities in the molecular structures of the geopolymers. It is assured that correlation between chemical composition and microstructural system are strongly related to physical properties and affects the damage accumulation.
12:10 - 12:30	ID 152; A Nonlocal Extension of an Anisotropic Continuum Damage Mechanics Model	ID 144; Fast Plastic Integration Algorithm for Damage Prediction in Forming Process Simulations	ID 159; Failure prediction on the second Sandia Fracture Challenge based on a cohesive zone model
	Soyarslan, C.; Gülçimen, B.; Bargmann, S.; Institute of Continuum Mechanics and Material Mechanics, Hamburg University of Technology, 21073 Hamburg, Germany	Halouani, A.; Li, Y.; Abbès, B.; Guo, Y.Q.; GRESPI/MPSE, University of Reims, France	Chiaruttini, V.; Mazière, M.; Feld-Payet, S.; Yastrebov, V.; Besson, J.; Chaboche, J.L.; Onera, France
	A thermomechanical framework is presented for damage coupled finite viscoplasticity with nonlinear isotropic hardening where finite strain kinematics relies on the multiplicative decomposition of the deformation gradient into elastic and plastic parts. The thermomechanical resolution introduces inelastic entropy as an additional state variable. For regularization of the doubly induced softening due to damage and temperature, viscous regularization is devised. The developed framework is implemented as an ABAQUS/UMAT subroutine and used in a set of exemplary problems reported in the literature.	This paper presents a simplified Pseudo Inverse Approach" (PIA) for the damage prediction in forging process simulation. Some intermediate configurations are created to well describe the deformation path. The formulation of an axi-symmetrical element based on the PIA is presented. A simplified 3D strain based damage model is coupled with plasticity and implemented into direct scalar integration algorithm of plasticity. The PIA results are compared to those obtained using ABAQUS software to show the efficiency and limitations of the PIA.	The Sandia Fracture Challenge is a blind round robin predictions of ductile tearing. This new edition concerns the failure of a TA6V sheet with notches and holes submitted to a prescribed displacement at low and fast velocities. This communication will present our modelling strategy (using provided tensile and shear tests data) involving viscoplastic behaviour and cohesive zone model (on predicted crack paths), with large displacement FE computations. Comparison between simulations and result of the tests will be discussed.
12:30 - 13:45	**LUNCH**		
14:00 - 16:00	**Mini-symposium in honor of Prof. J.L. Chaboche** **"Degradation vs Strengthening: Paradigms in Anisotropic Damage and Curing"** **Chairman: R. Desmorat (ENS, Cachan, France)** **Plenary lectures (Room: N101)**		
14:00 - 14:15	**Special Speech**		
14:15 - 14:55	**ID 168; On Materials with Time Dependent Properties: Application to the Continuum Mechanics of Curing**		
	Steinmann, P.; Hossain, M.; Saxena, P.; University Erlangen-Nuremberg, Germany		
	We address the curing process of magneto-rheological-elastomers (MRE) with/without application of magnetic fields. Phenomenologically, a viscoelastic fluid transforms into a viscoelastic solid due to chemical reactions; resulting in increased viscosity/stiffness, and shrinkage. When the MRE is exposed to a magnetic field during curing, the embedded magnetic filler particles form chain-like structures in the direction of the magnetic field. This results in anisotropic MRE with magnetic particles aligned in a particular orientation. These MRE show strong anisotropy in their mechanical/magnetic properties.		
14:55 - 15:30	**ID 135; From JL Chaboche damage models to ODM models for CMC and their validation**		
	Laurin, F.; Kaminski, M.; Bouillon, F.; Maire, J.F.; ONERA, the french aerospace lab, France		
	A way to fulfil the ACARE recommendations for 2020 consists in saving weight through the introduction of innovative composite materials, even in the hottest parts of the engine propulsion system with Ceramic Matrix Composites (CMC). This paper presents the Onera Damage Model adapted to the predictions of damage and failure of new generation of interlock woven CMCs and its validation through the comparisons with multi-instrumented tests (digital image correlation, MEB observations, acoustic emission...) on composite structures subjected to 3D loadings.		

15:30 - 16:00	**ID 166; Second order anisotropic damage framework: from theory to applications**
	Desmorat, R.; LMT-Cachan, France
	Continuum Anisotropic Damage Mechanics has initially been developed by J.-L. Chaboche in thermodynamics framework since late 1970s. It has reached maturity and can now efficiently be used in Finite Element computations. Main keypoints of modeling with second order anisotropic damage are addressed: convexity and continuous differentiability of state potential, positivity of intrinsic dissipation, non standard damage evolution laws, micro-cracks closure effect, active damage concept, permanent strains, visco/delay-anisotropic damage. Structural examples of applications are given for metals and concrete.
16:00 - 16:30	**COFFEE BREAK**
16:30 - 18:45	**Mini-symposium in honor of Prof. G.Z. Voyiadjis.** **"Multiscale Damage Mechanics"** **Chairman: L. Sun (UCI, USA)** **Plenary lectures (Room: N101)**
16:30 - 17:15	**ID 9; Phase Field Based Nonlocal Elasto-Plastic Damage Model**
	Voyiadjis, G.Z.; Mozaffari, N.; Louisiana State University, United States
	A nonlocal anisotropic, elasto-plastic, damage theory is developed using the phase field method. Two new tensors are proposed to act as interpolation and double well functions along with the Allen Cahn equation in order to obtain the evolution of the order parameter. By introducing a set of material parameters including a length scale parameter due to damage, there is a robust and simplified way to model the nonlocal behavior of elasto-plastic damage and predict the corresponding material behavior.
17:15 - 17:45	**ID 169; Innovative Strain Energy Based Thermo-Elastoviscoplastic Damage-Self Healing Model for Bituminous Pavements**
	Ju, J. W.; Hong, S.; Yuan, K.Y.; UCLA, United States
	Innovative strain energy based thermo-elastoviscoplastic damage-self healing formulations for bituminous pavement materials are proposed for numerical predictions of experimental measurements. A class of elastoviscoplastic constitutive damage-self healing model, based on a continuum thermodynamic framework, is proposed within an initial elastic strain energy based formulation. An Arrhenius-type temperature term will be uncoupled with Helmholtz free energy potential to account for the effect of temperature. The governing incremental damage and healing evolutions will be coupled and characterized through the net stress concept.
17:45 - 18:15	**ID 164; New Concepts in Continuum Damage Mechanics**
	Voyiadjis, G.Z.; **Kattan, P.**; Independent Researcher, Jordan
	Several new concepts in continuum damage mechanics are presented. These concepts deal with basic issue of damage mechanics. These concepts include the validity of the additive decomposition of the damage variable, the possibility of undamageable materials, damage processes in series and in parallel, healing and damage mechanics, and other issues.
18:15 - 18:45	**ID 87: L. Sun; Interfacial Debonding and Viscoelastic Behavior of Magnetorheological Nanocomposites**
	Damiani, R.; **Sun, L.**; UCI, United States
	In an effort to improve the third interface, magnetorheological elastomers with the addition of multi-walled carbon nanotube and acetone are developed. To understand how the nanocomposites are affected by the inclusion of these fillers, research is conducted in characterizing the interfacial debonding of elastomer composites. It is found that with a slight addition of carbon nanotubes and acetone, the mechanical performance and MR effect are improved when compared to conventional composites.
20:00-23:00	**BANQUET + ICDM TROPHIES FOR HONORED SCIENTISTS + ANNOUNCEMENT OF ICDM3 (2018)**

FRIDAY, JULY 10, 2015

09:00 - 09:40	**PLENARY 4 (Room: N101)** **Chairperson: D. Sumarac**			
	ID 167; Enlarged finite strain modeling incorporating Adiabatic Shear Banding and post-localization microvoiding as shear failure mechanisms			
	DRAGON, A.; LONGERE, P.; Institut Pprime (UPR CNRS 3346), ISAE-ENSMA, BP 40109, F-86961 Futuroscope-Chasseneuil, France			
	Adiabatic Shear Banding (ASB) and its consequences are considered as deterioration mechanisms incorporated in the dynamic plasticity modeling for high-strength metallic materials,following the authors'contributions during the last decade. A three-dimensional framework including ASB–induced anisotropy and starting from a specific scale postulate covers a range of dissipative phenomena and ASB–related material instabilities. Its recent developments, based on experimental evidence for Ti-6Al-4V alloy,include post-localization void-sheet formation and growth in the wake of a band cluster. Some structural applications are presented and discussed.			
	Room A001 **Chairperson: C.Q. Li**	**Room A002** **Chairperson: F. Bertrand**	**Room C001** **Chairperson: U. Kroll**	**Room C002** **Chairperson: H. Altenbach**
09:50 - 10:10	ID 38; Damage Theory Based Fatigue Simulation of Concrete Structure	ID 99; On thermodynamics for meso-mechanically informed damage-healing-plasticity of granular media	ID 66; Parameter identification of a damage model for the lifetime prediction of adhesively bonded joints	ID 88; Analysis of casting materials under thermal fatigue
	Liang, J.; Li, J.; Department of Structural Engineering, College of Civil Engineering, Tongji University, China	Li, X.; Du, Y.; Duan, Q.; Woody Ju, J.; Dalian University of Technology, China	Kroll, U.; Matzenmiller, A.; University of Kassel Germany	Altenbach, H.; Längler, F.; Naumenko, K.; Ievdokymov, M; Otto-von-Guericke-Universität Magdeburg, Germany
	In this paper, a fatigue damage model for concrete is proposed. Specifically, the damage evolution law is built upon a competitive mechanism of damage driving and damage healing effects which are due to random ruptures and coalescences of the micro-elements. By implementing the proposed method into the nonlinear finite element package, a lattice finite element model is built to simulate the competitive process. The agreement between the simulating results and the experimental data indicates the reliability of the proposed model.	The meso-mechanically informed tensor-valued net damage variable combining effects of both material damage and healing for anisotropic Cosserat continuum is defined. The healing variable is defined in the frame of thermodynamics to heal not only the damaged area but also initial defects of material. The macroscopic damage-healing and elasto-plasticity in granular media are characterized in terms of the thermodynamic dissipations, that is achieved without resorting to phenomenological constitutive model, damage-healing and elasto-plastic criteria and their evolution laws.	The model predicts the time to creep-fatigue failure of the joint, which is subjected to combined static and cyclic sustained loadings with constant or variable amplitudes. Creep and Wöhler fatigue tests of specimens with a nearly homogeneous stress state provide the data for the identification. The influence of particular model parameters on the predicted lifetime is illustrated, encouraging the identification strategy. Thus, these parameters are directly determined and computationally optimised afterwards. Finally, the model prediction is verified and validated.	High-temperature components are subjected to complex thermal and mechanical loading paths. Non-uniform temperature distribution and constraints by neighboring components result in complex timely varying stress and strain states. We analyze the inelastic behavior of a casting material Ni-resist D-5S in a wide stress, strain rate and temperature ranges. The material model is discussed and calibrated by creep and LCF tests. For the verification of the model, simulations of the material behavior under uni-axial TMF loading conditions are performed.
10:10 - 10:30	ID 92; Numerical analysis of laminated veneer lumber panels in fire	ID 42; A dynamic damage law with internal length to model localized failure	ID 82; Influence of the stress state on the predictability of the failure probability in the Beremin model	ID 120; Approximate yield criterion for porous cubic and hexagonal single crystals
	THI, V.D.; KHELIFA, M.; EL GANAOUI, M.; ROGAUME, Y.; University of Lorraine, France	Keita, O.; FRANCOIS, B.; Université Libre de Bruxelles, Belgium	Golisch, G.; Münstermann, S.; Bleck, B.; RWTH Aachen University, Germany	Paux, J.; Brenner, R.; Kondo, D.; Institut Jean Le Rond D'alembert upmc, France
	This paper presents models for calculating the fire resistance ratings of bolted timber connections based on fire-resistance test results carried out recently. A 3D FE thermal model was employed to analyze heat transfer within bolted Wood-Steel-Wood and Steel-Wood-Steel connections. The thermal model was found to provide good predictions when comparing the calculated temperatures and residual cross-section dimensions of timber connections with the experiment results.	This paper demonstrates the ability of a recently-developed dynamic damage law to reproduce the process of localized failure through the consideration of an internal length that inherits from the asymptotic homogenization procedure. The inertial effect at the micro-crack tips combined with the periodicity of the micro-cracks generates a time-dependent response. The delay in the induced damage provides ductility to the material. The thickness of the localized failure band is controlled by the combination of this delay and the wave speed.	In the presentation, the influence of local state of stress on the technical cleavage fracture stress is investigated. For this purpose, a phenomenological approach on cleavage fracture is given based on a series of tensile experiments in varying stress states. The test results are compared to simulation results to obtain the local stress state and the plastic strain at the fracture initiation site. These results are then investigated and discussed in concern of their influence on the technical fracture stress.	This work deals with the ductile fracture of crystalline materials. Specifically, it is focused on the derivation of a yield criterion for voided single crystals. By making use of a regularized form of the Schmid law, and thanks to heuristic improvements based on limit-analysis calculation for specific loadings, we obtain a Gurson-type yield criterion. The criterion is assessed by comparison with reference numerical results for different crystalline structures.

10:30 - 10:50	ID 116; Comparison of crack-width prediction models for steel-reinforced concrete structures	ID 45; Numerical modeling of crack growth in interpenetrating metal-ceramic composites	ID 93; Development of unified viscoplastic-damage model for crashworthiness analysis of boron steel safety components with tailored microstructures	ID 36; High cycle fatigue (HCF) model for unreinforced and reinforced thermoplastic polymers
	Huu Tran, H.; Li, C.Q.; Setunge, S.; School of Civil, Environmental and Chemical Engineering, RMIT University, Australia	Poniżnik, Z.; Nowak, Z.; Basista, M.; Institute of Fundamental Technological Research, Polish Academy of Sciences, Poland	Li, N.; Lin, J.; Dean, T.; Department of Mechanical Engineering, Imperial College London, United Kingdom	KRAIRI, A.; DOGHRI, I.; GUDIMETLA, M.; Université Catholique de Louvain, Belgium
	Prediction of time-to-cracking and crack-width of concrete cover provide useful information for decision making on maintenance and rehabilitation of reinforced concrete structures. Comparison of prediction models for time-to-cracking has been done in a recently published study, which indicated simple prediction models provide better good fit to various sets of experimental data than complex models. As a follow-up, this study uses published crack-width data to compare different models, developed in the literature and standard codes to predict crack-width of concrete cover.	A 3D FEM model for crack growth in bi-continuous metal-ceramic composites with interpenetrating microstructure (IPC) is proposed. The results for the load-displacements relationship in a plastically deformable reinforcing fibre computed by means of different material models will be shown. The J-integral and fracture toughness will be determined for a simplified IPC microstructure with reinforcing ligaments modeled as axisymmetric fibres, and for real IPC microstructure obtained from micro-CT images.	Hot stamped boron steel panels with tailored properties are popular as car safety components for maximised energy absorption. A physically-based unified viscoplastic-damage constitutive model has been developed, which takes the volume fraction of martensite into account. Thus the deformation behaviour and failure mode of boron steel parts having graded microstructure distributions can be described through a single set of equations. The model is implemented into LSDYNA via user defined subroutine to predict the crashworthiness performance of a safety beam.	Reinforced and unreinforced thermoplastic polymers (TPs) are widely used in a range of industrial sectors such as in automotive because of their interesting properties and their ease of production. As a result of their important expansion, produced parts are more likely to be subjected to extreme operating conditions such as high cycle fatigue (HCF). Hence numerical prediction tools for damage and failure are required. We present a multi-scale modeling approach for thermoplastic polymers under HCF based on damage mechanics.
10:50 - 11:10	**COFFEE BREAK**			
	Room A001 **Chairpersons: D. Kondo and A. Dragon**	**Room A002** **Chairpersons: I. Scheider and L. Stepanova**	**Room C001** **Chairpersons: X. Li and J. Shen**	**Room C002** **Chairpersons: A. Seupel and J. Lin**
11:10 - 11:30	ID 140; A ductile damage model for porous materials with non-associated Drucker-Prager matrix	ID 46; MULTISCALE MODELING OF DAMAGE AND FAILURE IN A BIOLOGICAL HIERARCHICAL MATERIAL	ID 26; Experimental Verification of a Thermodynamic Fatigue Life Prediction Model	ID 118; Application of a Local Continuum Damage Model to Porous TRIP-Steel
	Cheng, L.; Yun, J.; Oueslati, A.; Saxce, G. D.; Kondo, D.;UPMC, Institut Jean Le Rond D'Alembert, France	Scheider, I.; Xiao, T.; Yilmaz, E.; Schneider, G.A.; Huber, N.; Bargmann, S.; Institute of Materials Research, Helmholtz-Zentrum Geesthacht, Material Mechanics, Germany	Fogang, T.A.T.; Basaran, C.; Department of Mechanical and Aerospace Engineering, State University of New York at Buffalo, United States	Seupel, A.; Kuna, M.; Institute of Mechanics and Fluid Dynamics, TU Bergakademie Freiberg, Germany
	Porous materials having a dilatant non-associated matrix are investigated by means of the bipotential (a function of both stress and strain rate tensors) theory. In this framework, an extended limit analysis approach is proposed for a hollow sphere. The resulting macroscopic behavior is found to be non-associated and strongly affected by the matrix friction angle and dilatancy parameter. The obtained results are supported by suitable Finite Elements calculations. Finally, various predictions of the model with evolving porosity are presented.	We model microstructure and damage behavior of dental enamel using RVEs, combining hyperelastic models for the fibrous mineral and protein matrix material with cohesive zones for various failure mechanisms. Numerical homogenization of deformation and damage is conducted for the modelling of the second level representing rods of mineral fibers. Damage on this level is identified as traction-separation law based on the softening behavior of the RVE. Simulations of real experiments using the homogenized material agree very well with test results.	A fatigue model based on entropy is presented and validated through experiments. This model is purely physical and combines statistical mechanics with thermodynamic laws applied at a local scale. A damage parameter varying from 0 to 1 is derived. Like the irreversible internal entropy production, this parameter is a non-decreasing quantity that increases with the fatigue of the specimen. Depending on the application, one can associate this parameter to a safety coefficient to predict the lifetime of parts or structures.	Aim of this study is to describe the ductile damage of metastable austenitic steels which show TRansformation Induced Plasticity (TRIP). Therefore, a criterion for the austenite to martensite transformation, the caused additional hardening and evolution equations for the TRIP-strain are incorporated into the damage model of Rousselier. As a first approach, the model is calibrated against unit cell simulations of the porous material for different stress triaxialities.

11:30 - 11:50	ID 139; Numerical implementation and application of an extended Gurson model for nanoporous materials	ID 84; Modelling of damage and failure in High Mn TWIP Steels	ID 95; Probabilistic weibull methodology for fracture prediction of brittle and ductile materials	ID 48; Experimental study and multi-scales modeling of mechanical behavior of polycrystalline materials during ductile damage
	Morin, L.; Kondo, D.; Leblond, J.B.; Institut Jean Le Rond d'Alembert, France	Madivala, M.; Bleck, W.; Prahl, U.; Steel Institute, RWTH Aachen University Germany	Muñiz-Calvente, M.; Fernández-Canteli, A.; Shlyannikov, V.; Castillo, E.; Dep. of Construction and Manufacturing Engineering University of Oviedo, Spain	Zhao, Y.; Le Joncour, L.; Baczmański, A.; François, M.; Panicaud, B.; Wroński, S.; Gadalińska, E.; Braham, C.; Buslaps, T.; Université de Technologie de Troyes, France
	We investigate the behaviour of ductile nanoporous materials, based on a recent Gurson type criterion accounting for void size effects. Taking advantage of the normality rule, we derive the porosity and void size evolution equations and formulate a complete damage model for ductile nanoporous materials. This model is then applied for different stress triaxialities. The consideration of void size in addition to the porosity appears to have a strong influence on the mechanical behavior and on the porosity evolution.	Numerical prediction of damage in AHSS sheets is of great interest, as it is an effective way to optimize the design of parts. In order to predict the necking and fracture phenomena in TWIP steels subjected to uniaxial loading, a RVE approach is applied to create the virtual polycrystalline microstructure taking into account real microstructure features. The tensile test is simulated using CP based model by applying periodic boundary conditions and load to an RVE for predicting the plastic localization.	In this work, a three-parameter Weibull model for fracture prediction in brittle and ductile materials is presented. The case of two failure types is also handled. The parameter estimation is achieved for proportional stress state but also for non-linear growing stress states. The methodology proposed applies for material cases in which the fracture criteria are previously known and can be expressed as a function of an effective size (length/area/volume) for its subsequent use in FEM applications for practical design.	In the present work, 'in-situ" diffraction method was used to analyze the mechanical behavior of bi-phased polycrystalline materials during ductile damage, under tensile load. Due to its selectivity (phase or grain family information), diffraction enables to follow stress redistributions due to damage. The experimental data was used to improve different elastoplastic models, in the framework of large-deformation and taking into account ductile damage. The simulation results were compared to the information obtained during the necking stage.
11:50 - 12:10	ID 155; ON THE COUPLING OF DUCTILE DAMAGE WITH DISTORTION OF YIELD SURFACE FOR SHEET METAL FORMING	ID 19; A simple kinematical model of frame-masonry shear-wall systems	ID 102; Comparison of conventional mechanical testing with innovative techniques for determination of mechanical properties of nuclear power plant components materials	ID 68; Analysis and modeling ot carbonitrided steel components fracture process
	BADREDDINE, H.; YUE, Z.; SAANOUNI, K.; University of Technology of Troyes, France	Di Nino, S.; D'Annibale, F.; Luongo, A.; International Research Center on Mathematics and Mechanics of Complex Systems, Italy	Stefan, J.; Kopřiva, R.; Eliášová, I.; Siegl, J.; UJV Rez, a. s, Czech Republic	Karolak, C; Bouchard, P.O.; Montmitonnet, P.; Delattre, G.; Parks, D.; Mines Paristech, PSL Research University, CEMEF, France
	A novel constitutive model is proposed in which a fully coupled approach combining ductile damage, mixed nonlinear hardening and anisotropic plasticity is enhanced by introduction of yield surface distortion. The aim is to extend the capability of the model to investigate the metal sheet behavior under complex loading. Following the original idea of Marc François model, which introduced the yield surface distortion through the kinematic hardening, a new developed distorted deviatoric stress is used instead of the usual deviator stress.	The paper is aimed to evaluate the dissipation of frame-masonry shear-wall systems. A simple planar model, consisting of a cracked masonry shear-wall containing a centered window, confined by a portal, is considered under the action of a seismic forcing. The adopted strategy is based on: an appropriate definition of the kinematics of the cracked wall; an Extended Galerkin-based variational formulation of the equations of motion; an appropriate definition of the law of damage; an ad-hoc implementation of the resolution algorithm.	Within the nuclear power plant (NPP) operational life management, components lifetime extension requires information of structural material degradation. Innovative testing methods of Small Punch Testing (SPT) and Automated Ball Indentation Test (ABIT) are based on the determination of material properties from sub-sized specimens. Presentation is focused on employment of these techniques in NPP irradiated materials testing and evaluation at the accredited hot cell testing laboratory of UJV Rez, Mechanical Testing Department. Comparison with testing results from conventional methods is depicted.	In the automotive industry, the control of safety parts failure behavior is essential. A carbonitrided steel part is studied here. Carbonitriding is a thermochemical treatment leading to high surface hardness and good toughness properties. Fracture behavior of both the carbonitrided layer and the core material has been investigated experimentally with laboratory tests exhibiting different stress states. Numerical simulations using distinct failure criteria accounting for stress triaxiality ratio and Lode angle show good qualitative agreement with experimental observations.

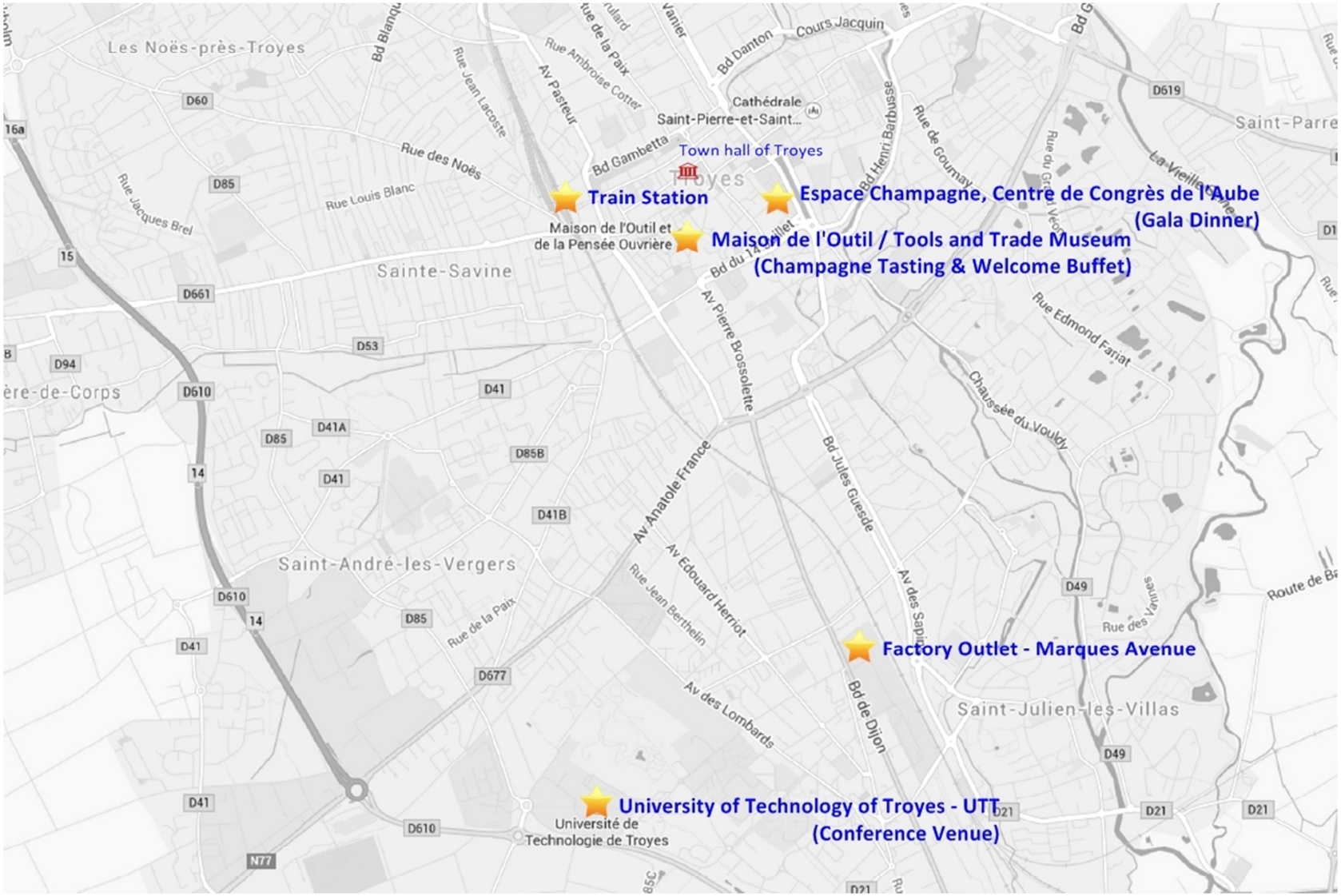
12:10 - 12:30	ID 133; Constitutive model for timber fracture under tensile and shear loads	ID 23; Damage Index Proposals Applied to Quasi-Fragile Materials Simulated Using the Lattice Discrete Element Method	ID 121; On the Failure Mechanisms in Reactor Pressure Vessel with Austenitic Cladding	ID 73; Experimental identification of damage mechanism in metallic materials used for particle accelerators
	Smidova, E.; Kabele, P.; Czech Technical University in Prague Czech Republic	Rodrigues, R.; Birck, G.; Iturrioz, I.; Avila, L.R.; Ufrgs, Argentina	Stefan, J.; Siegl, J.; Kytka, M.; Brumovsky, M.; UJV Rez plc, Czech Republic	Tabin, J.; Skoczeń, B.; Institute of Applied Mechanics, Cracow University of Technology, Poland
	A 2D homogeneous orthotropic constitutive model of tensile and shear fracture in timber based on fixed smeared crack approach has been implemented in ATENA® finite element software. The model captures (1) elastic and inelastic behavior in small deformation range, (2) material orthotropy, both in linear and non-linear range, (3) cracking across or along fibers, and (4) behavior under unloading/reloading. In this contribution we present model validation through numerical simulations of compact tension shear (CTS) tests of Radiata Pine timber.	In the present work was used a version of tridimensional lattice method (DEM) to assess in different ways the damage evolution in heterogeneous materials. This method lets us to make a calibration with the real material maintaining a energy balance consistence. The motion equation resultant of the spatial discretization is integrated using a explicit scheme (finite difference method). The capability of this model to simulate the process in the time is used also to model acoustical emission test.	Austenitic cladding in WWER RPV is made from two different layers with different fracture toughness. Based on fractographic analysis of fracture specimen in initial as well as in irradiated conditions, it was found that individual failure micromechanisms take place during crack propagation. The obtained results were used to find the relationship between failure micromechanism changes and fracture toughness values as well as of the effect of neutron irradiation on the failure micromechanisms.	Metallic materials used in particle accelerator undergo at ultra-low temperature various phenomena: DPF, phase transformation and evolution of micro-damage. Also these materials are subjected to flux of secondary particles of high energy, which cause formation of local defects. All phenomena influence on the process of material failure. Based on the own experimental data, collected during several campaigns of tensile tests carried out on metallic samples (also irradiated) immersed in liquid helium (4.2 K), experimental identification of damage mechanism is presented.
12:30 - 13:45	**LUNCH**			
14:00 - 14:40	**PLENARY 5 (Room: N101)** **Chairperson: J.L. Chaboche**			
	ID 20; Modeling of stress-state-dependent damage and failure of ductile metals			
	Brünig, M.; Brenner, D.; Gerke, S.; Universität der Bundeswehr München, Germany			
	An anisotropic damage and failure model based on kinematic definition of damage tensors is presented. Different damage criteria formulated in stress space are proposed based on experiments and corresponding numerical simulations as well as on various numerical calculations on the micro-scale. The approach is based on tests with uniaxially loaded specimens as well as on series of new experiments with two-dimensionally loaded specimens. Corresponding numerical simulations of these tests show that they cover a wide range of stress states.			
	Room A001 **Chairpersons: H. Sadrhosseini and S. Münstermann**	**Room A002** **Chairpersons: V. Kornev and B. Skoczen**	**Room C001** **Chaipersons: N. Li and O. Naimark**	**Room C002** **Chairpersons: X.L. Gong and N. Rakotomalala**
14:50 - 15:10	ID 17; Phenomenological modelling of impact toughness transition behaviour	ID 91; Damage evolution in a circular bar undergoing phase transformation induced by torsion at cryogenic conditions	ID 114; Environment Effects on Thermal Fatigue Damage of “AISI H11” Hot Work Tool Steel	ID 115; A coupled thermomechanical simulation of the failure of thermal barrier coatings of turbine blades
	Münstermann, S.; Kucharczyk, P.; Golisch, G.; Döbereiner, B.; Forschungszentrum Jülich GMBH, Germany	Ortwein, R.; Skoczeń, B.; Cracow University of Technology Poland	SALEM, M.; LE ROUX, S.; REZAI-ARIA, F.; ICAA-Mines Albi, France	Rakotomalala, N.; Feyel, F.; Roos, A.; Safran CRT, France
	The toughness transition behaviour of ferritic steel results from the fact that either cleavage or ductile fracture mechanism is activated. Temperature, strain rate and the material´s hardening properties are the major influences on toughness properties. We descibe a model to predict the Charpy impact toughness properties of steels. It consists of a strain rate and temperature dependent yield potential and a damage evolution law that couples stress-state dependent criteria for cleavage fracture and ductile fracture. Successful model application is demonstrated.	Austenitic stainless steels are used in structural applications down to absolute zero (example in superconducting magnets). Several samples made of austenitic stainless steels were subjected to monotonic and cyclic torsion at 77K. Loading/unloading cycles, allowed measurements of unloading modulus and the evolution of damage. Damage parameter has been added to the constitutive model that accounted for the phase transformation. Combination of the hardening effect of the phase transformation and the damage softening effect allowed to reproduce better the experimental results	Hot working tools experience cyclic transient thermo-mechanical loadings under severe corrosion effects. In aluminium die casting, Fe-based dies form multi-layered oxides or Fe-Al intermetallics, leading to decrease the die life. Thermal Fatigue (TF) experiments are performed on axisymmetric disc-shaped specimens under air, nitrogen and argon. Tests are also conducted on specimens coated by Al-based intermetallic. The role of intermetallic and oxide layers on TF mechanisms is demonstrated. By reducing the partial pressure of oxygen, crack initiation life increases drastically.	Coupled thermomechanical simulations of the failure of thermal barrier coatings for turbine blades are presented. Their main degradation mode is due to the initiation and propagation of cracks caused by the out-of-plane undulation growth of an oxide layer formed in service. Inserting thermomechanical cohesive zone elements at the interface between the coating and the substrate allows to account for the changes in the load transfer and the variations in the heat flux as a consequence of interface mechanical degradations.

15:10 - 15:30	ID 127; A simplified hybrid approach for damage and failure predictions in composite plates with large cuts	ID 34; "Damage Accumulation and Fracture of Weld Joints under Low- Cyclic Loading Conditions"	ID 146; Ductile failure of Nuclear steel accounting for strain ageing	ID 76; Experimental study on horizontal shear crack control of prestressed corrugated composite beams
	JULIEN, C.; HUCHETTE, C.; LAURIN, F.; ONERA, France	Kornev, V.M.; Lavrentyev Institute of Hydrodynamics SB RAS, Russian Federation	Ren, S.; Maziere, M.; Forest, S.; Morgeneyer, T.; Gilles Rousselier; Mines ParisTech, France	Chae, S.U.; Cho, B.Y.; Kweon, O.S.; Kim, H.Y; Fire Research center, KOREA INSTITUTE of CIVIL ENGINEERING and BUILDING TECHNOLOGY, Republic of Korea
	In order to deal with the problem of large cuts in composite plates submitted to multiaxial 3D loadings, we propose hereby a multiscale hybrid approach for predicting damage and failure of such structures. This method is based on the thermo-mechanical properties of the elementary layer and of the interface, and allows in particular to predict the evolution of transverse cracking and its influence on the delamination propagation. The formulation of the model is exposed along with several validation cases.	Failure under single and cyclic pulsating loading conditions is under consideration. A crack is located in the welding seam. The plots constructed for external load versus lengths of cracks divide the plane by pairs of curves into three subareas representing the absence of fracture, damage accumulation under repeated loadings, and disintegration. The process of damage accumulation in pre-fracture zones is described for the linear and nonlinear summation of damages. The condition of a stepwise crack tip extension has been derived.	The influence of Strain ageing and Portevin Le Chatelier effect on ductile failure of a C-Mn steel is investigated in a large range of temperature using from an experimental and theoretical and numerical point of view. The loss of ductility observed in the strain ageing temperature domain is reproduced by finite element simulation associated with a uncoupled ductile failure model.	If the steel exposes to high temperature as a fire, it is a major cause of horizontal sheer crack then structures may collapse. Therefore, it applied prestress using the reverse direction of horizontal shear cracks to control it. Also, it had evaluated the fire-resistance performance of PS composite beams applied wave shape in order to increase the efficiency of prestress. The results showed that applying one-layer corrugated and increasing the height of beam reflects of decreasing horizontal shear cracks.
15:30 - 15:50	ID 47; Effect of the manufacturing parameters on the defects in the open cell aluminum foam	ID 75; A study on the collapse mechanism of high strength concrete columns apply to fiber-cocktail	ID 77; A Study on the Microstructure of Welded Structural Steel Members at High Temperature	ID 136; Optimization of reinforcement for RC walls with introduction of a seismic accelerogram
	Zhu, F.; Poulet, J.; He, S.; Gong, X.L.; University of Technology of Troyes, France	Kwon, K.S.; Kim, H.Y.; Chae, S.U.; Cho, B.Y.; Fire Research center, KOREA INSTITUTE of CIVIL ENGINEERING and BUILDING TECHNOLOGY, Republic of Korea	Cho, B.Y.; Kim, H.Y.; Yang, S.C.; Chae, S.U.; Fire Research center, KOREA INSTITUTE of CIVIL ENGINEERING and BUILDING TECHNOLOGY, Republic of Korea	BELAIDI, O.; KHEDDACHE, L.; OULD OUALI, M.; HANNACHI, N.E.; Laboratoire Elaboration et Caractérisation des Matériaux et Modélisation – LEC2M, Algeria
	This work concerns the analysis of the casting defects in aluminum foam by numerical simulation during the manufacturing process. Because the bubbles may be trapped in the molting aluminum and will affect the mechanical properties of the foam, the analyze focuses on the pouring and infiltration. The velocity of injection, the infiltration distance and diameter of the preform should be studied for their influences on the bubble formation. The obtained results can be used to optimizer the manufacturing process.	In general, if the compressive strength of concretes to over 50MPa, it is classified as high strength concrete(HSC). This study was conducted fire-resistance test of high strength concrete columns that applied to mixed Polypropylene fiber and steel fiber in order to control the spalling and strength the concrete inside the binding. As a result for fire-resistance test of concrete apply to 60MPa and 100MPa, in case of 60MPa, collapse time was delayed to 20% and 100MPa was delayed to 76%.	This research is to show the microstructure of fracture parts of structural steels by welding at the high temperature. Discontinuity of mechanical and chemical property at HAZ of welding parts is the cause of decreasing structure safety. Therefore, this study was determined the effect of the welding of steels through a high temperature tensile tests and fracture portion of the microstructure. The results showed that does not cause destruction until temperature reached 600°C.	The objective of this study is to optimize the performance of a frame in reinforced concrete structure braced by RC walls under seismic loading. The frame is subject to its base to a seismic accelerogram. This model was implemented in a finite element code "abaqus". Several provisions of reinforcement in the RC walls have been proposed. The models used allow to view the damage. An ideal arrangement is adopted for building the walls of the RC structure.

15:50 -16:10	ID 138; The covariance principle and a 4D formalism for rate formulations of constitutive models	ID 80; Effects of sandblasting on surface morphology and contact properties	ID 170; EVALUATION OF MICROMECHANISMS OF DAMAGE AND FRACTURE IN COMPOSITE JOINTS	ID 52; Numerical Simulation of Failure Process in FRP Concrete Structures
	Wang, M.; Panicaud, B.; Rouhaud, E.; UTT, France	ZHAI, C.; GAN, Y.; Hanaor, D.; The University of Sydney, Australia	Dzenis, Y.; Department of Mechanical and Materials Engineering, University of Nebraska-Lincoln, United States	Mazzucco, G.; Pellegrino, C.; Majorana, C.; Salomoni, V.; University of Padua, Italy
	The rate formulation to describe the elasto-plastic behavior based on the covariance principle to ensure objectivity is investigated, using different rheological associations. It will be compared to the classical models obtained in finite transformations. This approach is based on the use of the Lie derivative and a four-dimensional formalism. Moreover, several numerical tests will be performed to compare the characteristics of the different approaches. This type of methodology will be investigated next for the rate formulation of damage.	This work is to investigate the effects of sandblasting treatment on reshaping surfaces in terms of curvature, roughness, and fractal dimension. Different-sized glass beads are applied in blasting treatment on aluminium samples. The surface topology is characterized to evaluate the results of blasting by interferometry-based profilometry and scanning electron microscope. The normal contact stiffness is obtained through nano-indentation using flat tips with diameters ranging from 50 to 500 um to further study the surface modification at various scales.	Advanced composites are used in repair of aerospace structures. Adhesively bonded composite patches are capable of minimizing balance and clearance problems on control surfaces and can be readily formed to complex aircraft contours. Reinforcement in a patch can be tailored to suit the loading configuration and to minimize undesirable stiffness increases. Adhesive joining is also attractive for future technologies of integrated manufacturing of large composite structures. One problem impeding wider use of adhesive joints is a lack of reliable methods of their non-destructive evaluation and life prediction. This paper will review NDE monitoring of cracks in joints in the authors group. The methods covered include acoustic emission and acousto-ultrasonics utilizing both standard and embedded sensors. Experimental and theoretical issues will be presented. Applicability of the techniques for life prediction will be discussed.	The practice of recovering existing concrete structures with FRP sheets externally bonded has been largely adopted in these years, but nowadays the interaction behaviour between the two materials is not completely characterized. In this work, mechanical behaviour of concrete structures reinforced with FRP has been numerically evaluated. A modified damage law has been adopted to consider the interaction between FRP and concrete, able to describe the debonding process and confinement effects. Numerical results have been validated with experimental data.
16:10-16:30	ID 171; Numerical simulation and experimental investigation of damage evolution in steel S355	ID 98; Damage and low-cycle fatigue of the structural materials under program loading	ID 101; Assessment of creep damage in Cr-Mo ferritic steels under multiaxial state of stress	ID 70; PCM inclusions in concrete materials for thermal storage problems
	Tu, H.Y.; Schmauder, S.; Weber, U.; Morgeneyer, T.F.; Cheng, Y. Institute for Materials Testing, Materials Science and Strength of Materials (IMWF), University of Stuttgart, Germany	Bobyr, M.; Khalimon, O.; National Technical University of Ukraine "Kyiv Polytechnic Institute", Ukraine	Goyal, S.; Laha, K.; Bhaduri, A.K.; Indira Gandhi Centre for Atomic Research, Kalpakkam, India	Xotta, G. ; Mazzucco, G.; Majorana, C.; Salomoni, V.; Giannuzzi, M.; Miliozzi, A.; University of Padua, Italy
	The in situ laminographic scanning was performed on 1 mm thick sheet specimen of steel S355. After the reconstruction of the laminographic data, 2D sections (T-L and T-S sections, where L is rolling direction, T is loading direction and S is the thickness direction) of 3D images of the sheet specimen are derived. With the real f0-values obtained from the laminographic data, the Rousselier model predicts the heterogeneous crack propagation in the sheet specimen well.	Presented new results of low-cyclic fatigue researches aluminium alloys considering damage. Offered the phenomenological damage model and rupture criterion. They consider interaction of damage in a loading cycle on an active site and in dwell, and consider two fracture mechanisms: tear and shear. Proved validity range of the developed model and criterion for proportional and nonproportional types of low-cyclic loading. Offered as base experiment on low-cyclic fatigue a sawtooth cycle form and isothermal creep in the conditions of uniaxial tension-compression.	Finite element analysis coupled with continuum damage mechanics has been employed for assessing the creep damage in Cr-Mo ferritic steels under multiaxial stresses, introduced through circumferential notches. Creep rupture lives increased and tend to saturate with degree of constraint imposed by multiaxial stresses along with appreciable variations in fracture appearance. Creep damage and rupture life under multiaxial stresses and different extents of response of the steels is addressed on incorporating the representative stress concept in the damage mechanics equations.	In this work, solid thermal storage systems having inclusions of Phase Change Materials are considered. In specific, the reduction of the mechanical performance of concrete due to the presence of PCM is investigated, with the use of a hygro-thermo-mechanical FE code. 3D mesoscale models are developed, going to explicitly represent concrete as a heterogeneous material. This representation is able to determine the effects of internal hyperstaticity due to the different mechanical characteristics, triggering stress concentrations that can lead to damage.
16:30	**COFFEE BREAK AND CONFERENCE CLOSURE**			
16:30	**LABORATORY VISIT**			

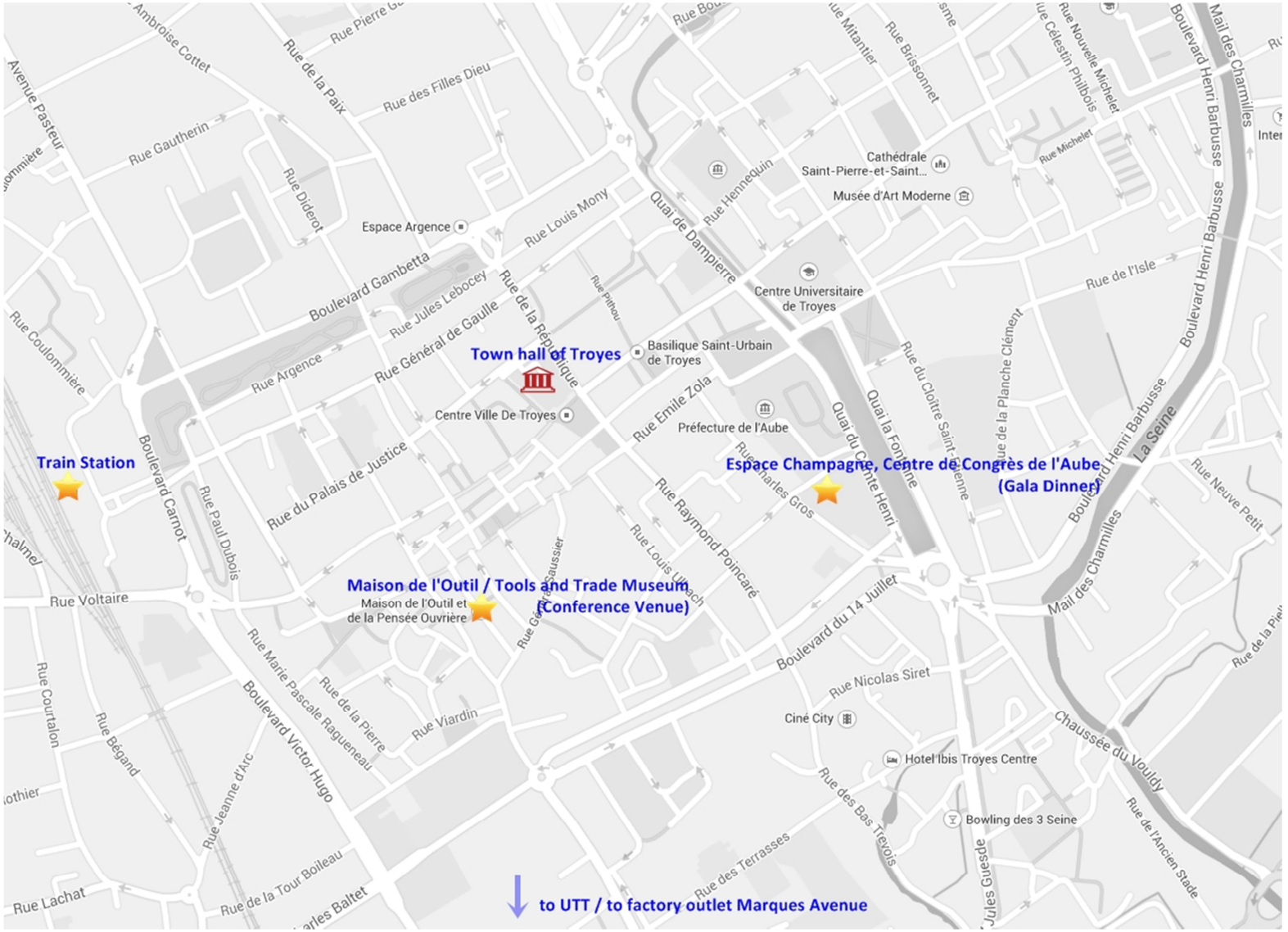
PRACTICAL INFORMATION

Map of Troyes



For interactive map of Troyes, go to http://carte.soyezsurpris.fr/en/?locale=en

Map of Troyes City Centre (Centre Ville)



Champagne Tasting
& Welcome Buffet

Date : Wednesday, July 8th 2015
Hour : 20:00 – 22:00
Place : Maison de l'Outil et de la Pensée Ouvrière / The Tools and Trade Museum (www.mopo3.com)

Champagne

Provided by : **Deschannes Père et Fils**
LES RICEYS-HAUT
TEL : 03.25.29.39.79
E-mail: contact@champagne-dechannes-pere-et-fils.fr

The first thing that's good to know about Champagne is that, unlike other wine (especially red), champagne is ready to be consumed soon as it is on the market but no longer improves (or very little).

However, this does not mean that it can't be kept long after the acquisition.
A non-vintage wine cellar can be kept up between 4 and 5 years and 8 to 12 years for a vintage wine. These figures are average, they vary according to each of the storage conditions.

In all cases, it is very important to ensure good storage conditions bottle because there is nothing more destructive for wine in general (and especially champagne) than being stored too long in strong lighting and excessive heat.

After purchasing your favorite bottle, it is better to let it rest for a while. Indeed, during transport, the wine is exposed to demanding conditions (agitation, heat) that alter its balance. A few hours or days are necessary to allow regain balance. In case of champagne, that period may avoid the phenomenon of "stacking" (uncontrolled foam production at the opening of the bottle).

Once the precious beverage in your possession, if it is not consumed in the coming days, it should always be stored in a place respecting some basic rules of storage to ensure optimal preservation. It is also good to note that the wines evolve differently depending on the volume of containers. Small volumes (a quarter and a half bottle) should be drunk quickly, that is to say between three months and one year after purchase. *(source: http://refletdesbulles.ch/choisir-et-conserver/)*

The Tools and Trade Museum

Created by Paul Feller s.j., a forward-looking Jesuit priest, the MOPO is dedicated to the passing on of knowledge and the promotion of apprenticeship.

The museum boasts a collection of more than 10 000 tools distributed across 61 display cases in a remarkable scenography. Many beautiful tools are carefully stored in the museum's reserves. The contemporary power of the scenography adds to the story and power of each tool, painstakingly brought back to life.

A place dedicated to the passing on of knowledge
The 10.000 tools on show at the MOPO are unique witnesses of the intergenerational transfer of craftsmen. They invite the visitor to embark on a historic journey and are keys to understanding trades today. A unique example in its kind, the MOPO is an open window on past and present trades, for all those who are interested in craft trades as well as in industrial technologies, in history as well as in trades.

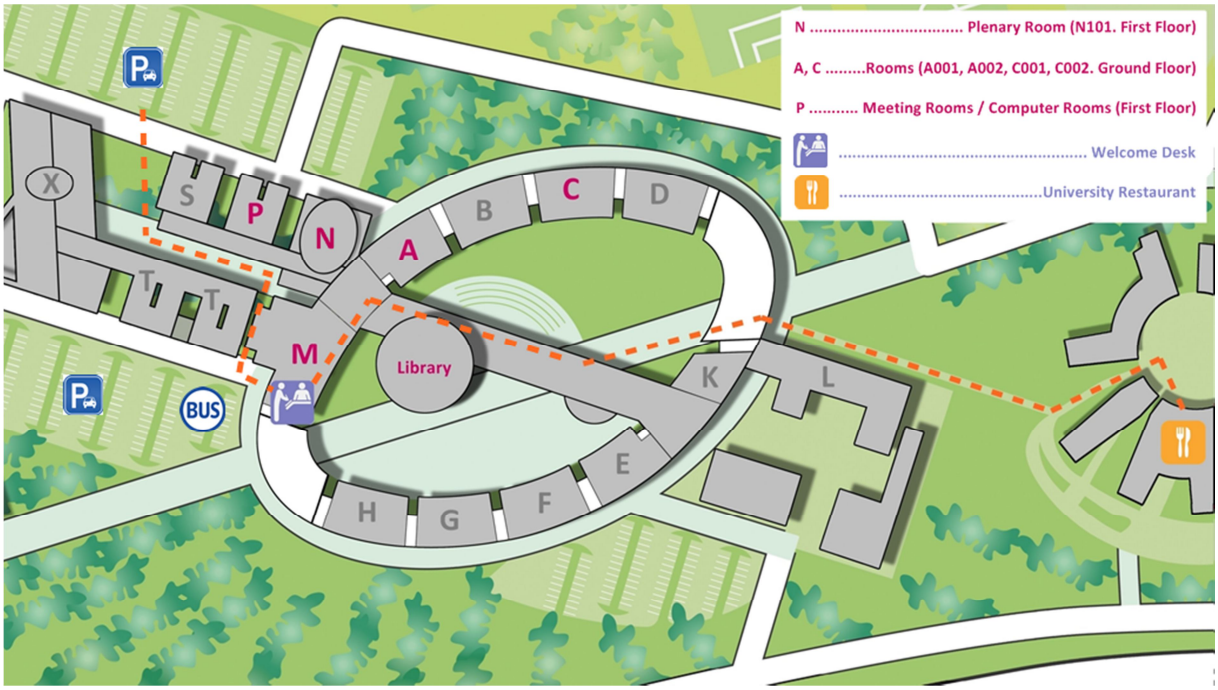
Through a rich programme constantly renewed, the MOPO highlights craftsmen and craftswomen,

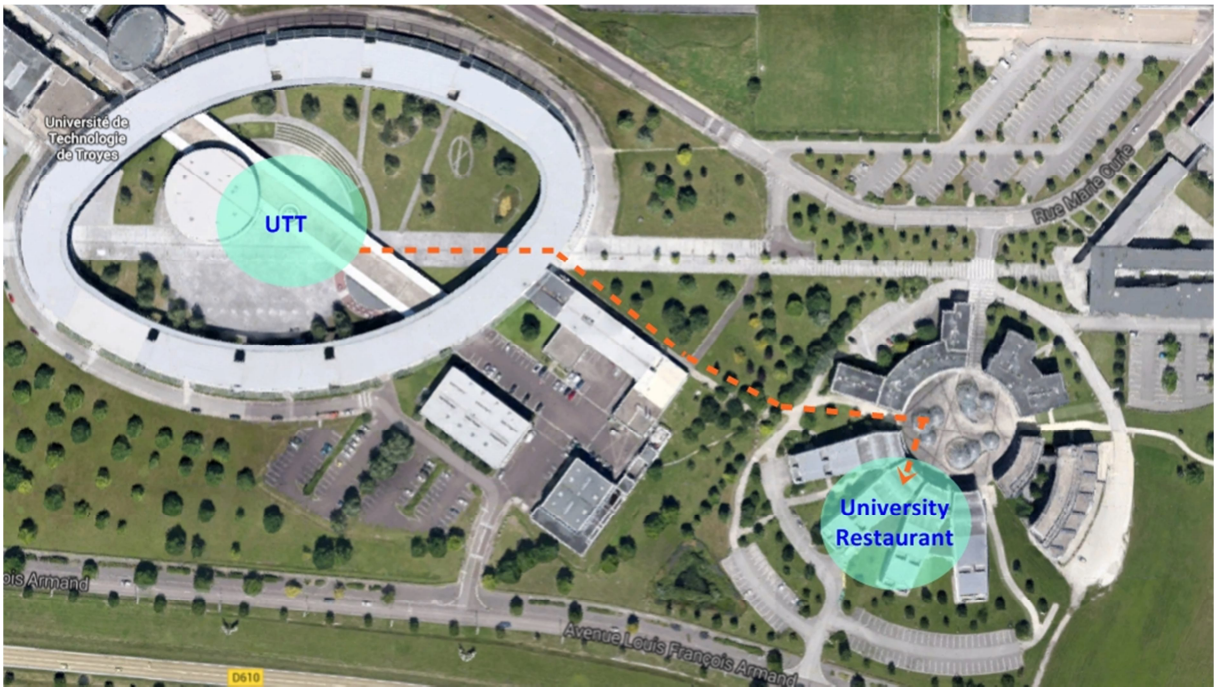
emphasising their knowledge, expertise and life-skills. *(source: http://mopo3.com/en/collections/)*

Lunches

Date : July 8th, 9th, 10th, 2015
Hour : Noon
Place : The University Restaurant

Please bring your LUNCH TICKETS that have been given to you. You cannot exchange your *lunch tickets* of one particular day for another day.





Banquet

Date : Thursday, July 9th 2015
Hour : 20:00 – 23:00
Place : Espace Champagne at the Centre de Congrès de l'Aube
Address: Centre de Congrès de l'Aube - Conseil Général de l'Aube.
2 rue, Pierre-Labonde. 10026 Troyes Cedex. France

- **Gala dinner**
- **ICDM trophies for honored scientists**
- **Announcement of the ICDM3 Organizer**
- **Entertainment:**
  - **Jazz Manouche by Trio Swing 51**
  - **Close-up Magic Show**

Location of the Banquet: **Espace Champagne (Centre de Congrès de l'Aube) - 2 rue Pierre-Labonde, 10026, Troyes Cedex, France**

Organized by: ICDM2 Local Organizing Team (LASMIS) – University of Technology of Troyes (UTT)

Saturday Morning Free Program: Visiting Troyes City Center and/or Shopping at Factory Outlets during the Summer Sale Period

On Saturday Morning, July 11th 2015, participants who would like to stay in Troyes are free to visit the city center of Troyes and/or to do shopping in the factory outlets to take advantage during the summer sale period. For those who plan to stay in Troyes on Saturday, please kindly ask the coupons at the front desk of the conference situated in **Building M** at UTT. You should exchange this coupon at the front desk (in French: Accueil) of each factory outlets (Marques Avenue or McArthurGlen) to get a free shopping bag or a discount voucher.

Troyes City Center Tour

Participants are free to visit the city center of Troyes, **a brochure of "Troyes and Surroundings"** will be provided to each participant, and **a limited special brochure concerning only the Troyes City Center** including recommended visit paths will be provided for those who wish to visit the city center on Saturday. These limited brochures will be given to participants on a *first-come*, *first-served basis* (by request at the front desk on the conference days).

Shopping!

The **"factory shops"** were born in TROYES in the 1960s, to sell off local manufacturers' ends of lines. At first only open to factory staff, little by little they were opened to the general public.

Let's remind ourselves of some of Troyes great brands: **LACOSTE**, **DD**, **BABYGRO**, **ABSORBA**, **PETIT BATEAU**, **GIL**, **MARINER**, **VITOS**...

Today, the fame of the "Factory Shops" and the know-how of our Department's manufacturers is second to none. Thousands of visitors from all regions flock to our city to snap up the bargains available: reductions offered vary from **30 to 70%** and the number of visitors to these shops is estimated as being close to three million each year.

The greatest international brands are now represented. They make TROYES a major centre for Textiles and Clothing, and the true Capital for "factory shops" for personal outfitting. You can thus dress in "chic", "fashion" or "sport" styles according to your needs, with footwear, lingerie and ready to wear available, as well as household linen, etc... **in over one hundred shops.**

Visit the websites of the different shops.

1. **Marques Avenue Troyes**

For more information go to http://www.marquesavenue.com, or scan this QR code on the right with your smartphone (QR Code Reader application is needed in your smartphone).

2. **McArthurGlen Troyes**

For more information go to http://www.mcarthurglen.fr , or scan this QR code on the right with your smartphone (QR Code Reader application is needed in your smartphone).

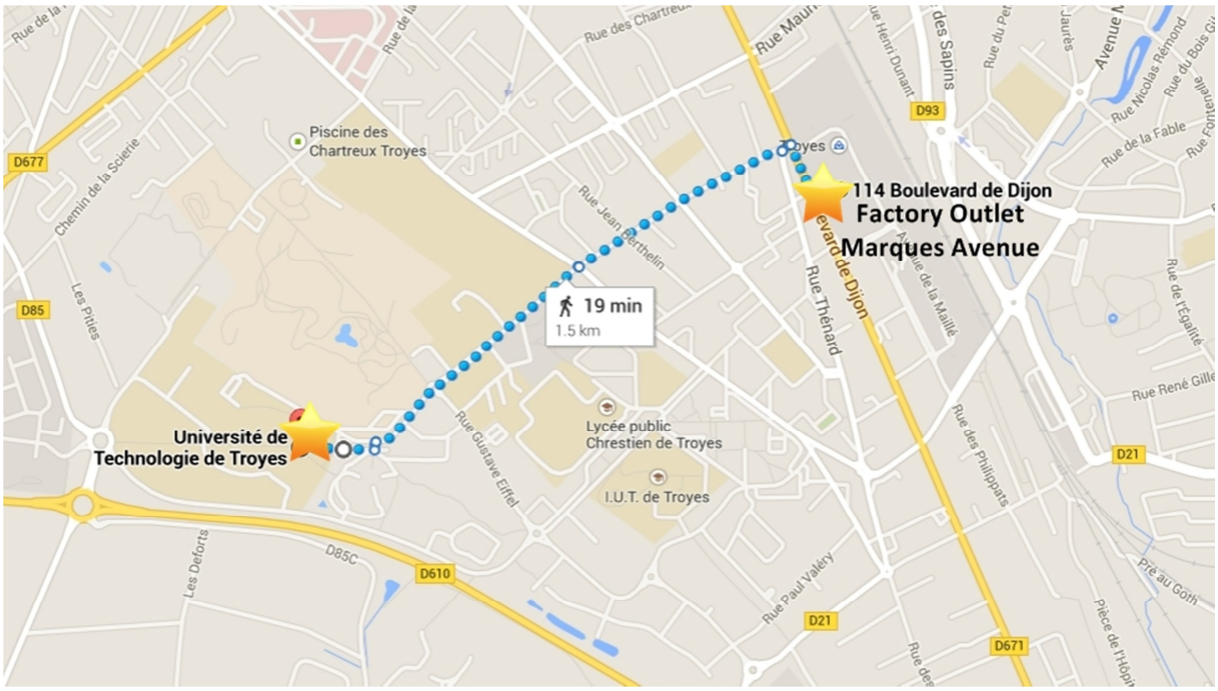
3. MarquesCity

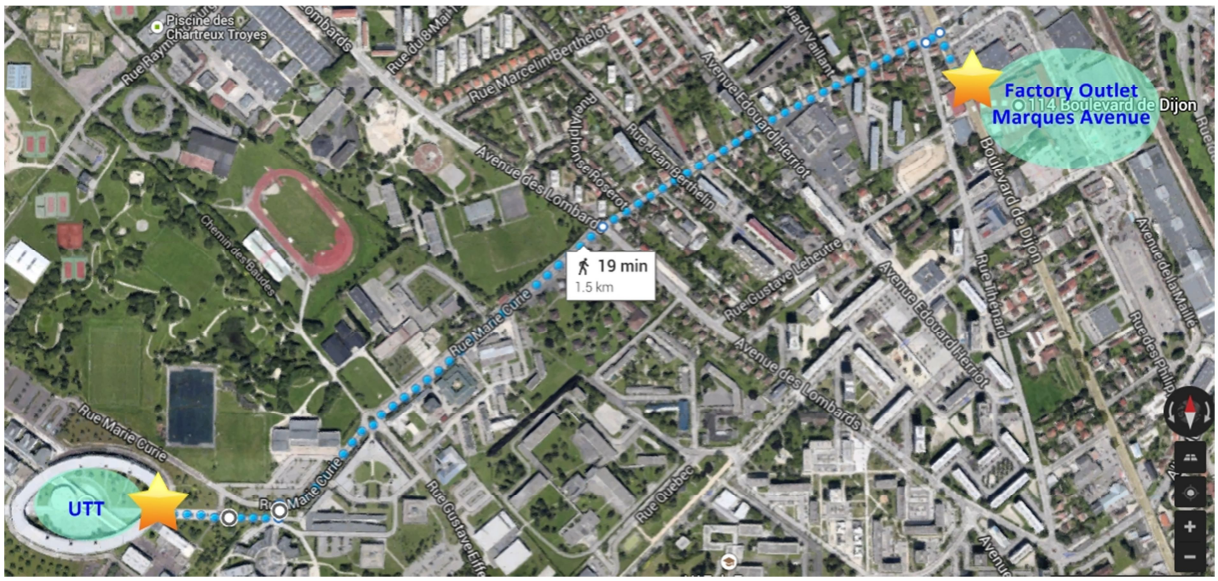
For more information go to http://www.marquescity.com, or scan this QR code on the right with your smartphone (QR Code Reader application is needed in your smartphone).

THE NEAREST factory outlet to the University of Technology of Troyes is **MARQUES AVENUE TROYES**, it is located at 114, boulevard de Dijon, 10800, Saint-Julien-les-Villas, and it is just a 19 minutes-walk from UTT (*see the map below*).

The two farther factory outlets are both located in Pont-Sainte-Marie:

- McArthurGlen Troyes. Address: Voie du Bois, 10150 Pont-Sainte-Marie
- Marques City. Address : 21 rue Marc Verdier, 10150 Pont-Sainte-Marie.





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